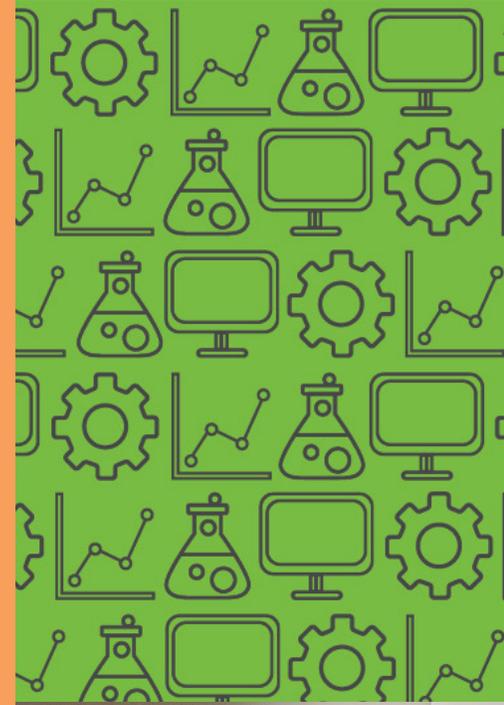


# GREATNESS<sup>®</sup> STEMS FROM IOWANS

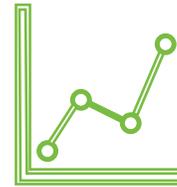
GOVERNOR'S STEM ADVISORY COUNCIL

## Iowa STEM Evaluation Report 2018-2019



# Iowa STEM INDICATORS

These indicators are provided by the external evaluation team consisting of University of Northern Iowa's Center for Social and Behavioral Research, Iowa State University's Research Institute for Studies in Education and The University of Iowa's Iowa Testing Programs.



- In 2018-2019, STEM Scale-Up Program participants performed better on the Iowa Statewide Assessment of Student Progress (ISASP) compared to all students statewide. On average, 2% more STEM Scale-Up Program participants met or exceeded proficiency benchmarks in mathematics and science.
- In both mathematics and science achievement, the average percentages of proficient students in the 2016-2018 biennium period are higher than the 2011-2013 biennium period among 8th grade students.
- In 2018, Iowa's average ACT score was 21.2 in mathematics and 22.0 in science, compared to 20.5 and 20.7 nationwide, respectively. The average Iowa STEM score was 21.8 compared to 20.0 nationally.
- From 2013 to 2018, the number of students taking advanced placement courses in STEM-related subjects increased 22% from 5,355 to 6,527.

- The percentage of enrollment in most STEM subject areas has increased annually in the last five years among underrepresented minority students.
- From 2013-2016, Iowa high school graduates who took part in the STEM Scale-Up Program were 22% more likely to major in a STEM field for those enrolled in an Iowa Regent University and 5% for those enrolled in an Iowa community college, compared to their counterparts who did not participate in Scale-Up.
- The number of STEM-related degrees awarded to African-American students rose 41% at 4-year public, and 13% at private, 4-year not-for-profit colleges and universities in Iowa since 2012-2013, maintaining stable at 2-4% of all degrees per year. The number of STEM-related degrees awarded to students who are Hispanic rose 111% at 4-year public and 28% at private, 4-year not-for-profit colleges and universities in Iowa for the same time period.

- Community college STEM diplomas, certificates and degrees increased 13% among white graduates and 31% among minority graduates compared to 2013.
- In 2018, there were an estimated 14,280 vacancies in STEM jobs statewide.
- A higher percentage of students who participated in STEM Scale-Up Programs said they were very interested in working in Iowa after completing their studies compared to students statewide.
- In 2018-2019, 81% of all students statewide indicated they were very interested or somewhat interested in pursuing a STEM career.
- Iowa STEM occupations, which comprise 21% of all Iowa jobs, are expected to grow 1.0% annually from 2016 to 2026 compared to .8% annual growth across all occupations.
- STEM jobs pay an average of \$22,330 higher per year (\$67,057 in STEM versus \$44,727 for all other).

# STEM SCALE-UP PROGRAM

The STEM Scale-Up Program provides high-quality STEM education programs to PreK-12 youth in school and out of school along with training for educators to implement effectively.

A total of 1,180 educators delivered at least one of ten world class STEM Scale-Up Programs in 2018–2019.

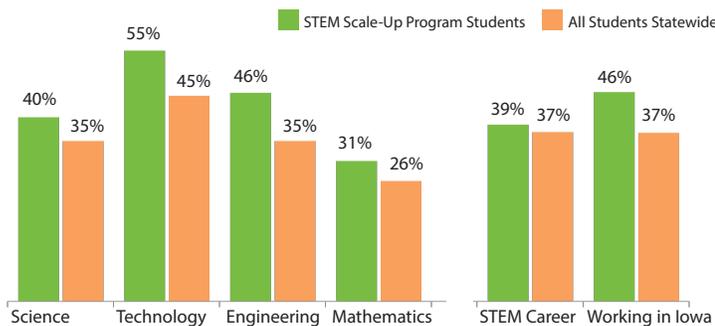
An estimated 80,000 preK–12 youth participated in one or more Scale-Up programs in 2018–2019.

Since 2012, an estimated 542,928 preK–12 Iowans have participated in STEM Scale-Up programming.

94% of educators taking part in STEM Scale-Up programming agreed or strongly agreed that they now have more confidence to teach STEM topics and have increased their STEM knowledge.

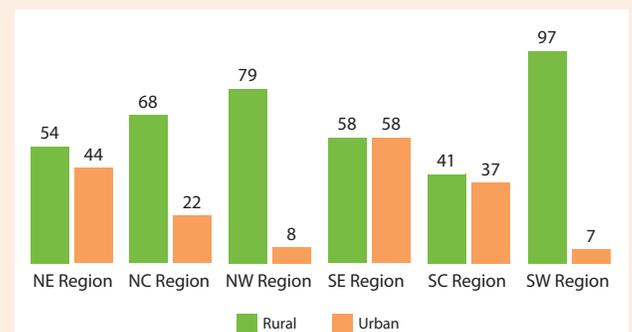
90% of educators reported that they will be using the STEM Scale-Up Program with their students again next year.

## STUDENT INTEREST IN STEM



A higher percentage of students who participated in STEM Scale-Up Programs said, “I like it a lot” or were “very interested” in STEM-subjects, as well as in pursuing a STEM career and in working in Iowa after graduation compared to all students statewide.

## RURAL AND URBAN AWARDS

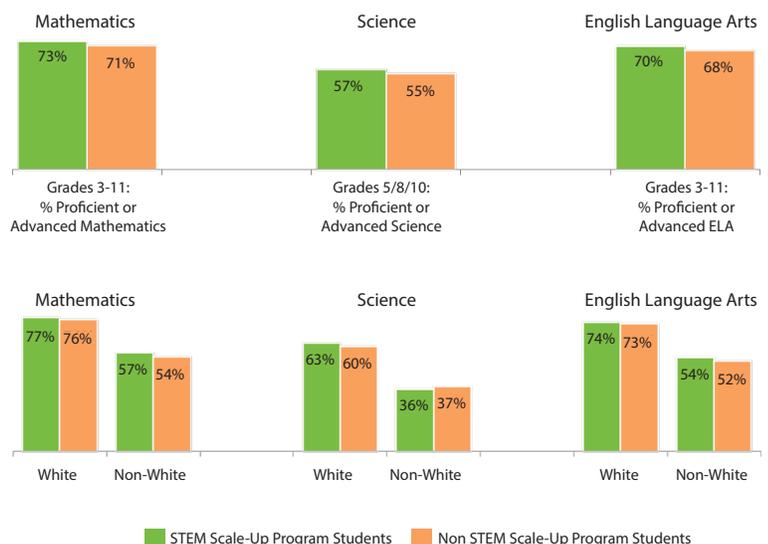


Urban communities include 49 communities in Iowa listed as “urbanized areas” by the U.S. Census Bureau and communities with a population of 20,000 or greater.

## STUDENT ACHIEVEMENT AT PROFICIENT OR ADVANCED LEVEL

STEM Scale-Up Program participants performed better on the Iowa Statewide Assessment of Student Progress compared to students who did not receive STEM Scale-Up Programming. In 2018-2019, 2% more STEM Scale-Up Program participants met proficient or advanced level benchmarks in mathematics, science and English language arts.

For minority students, 3% more STEM Scale-Up Program participants met proficient or advanced level benchmarks in mathematics and English language arts compared to minority students who did not participate; however, this trend was not observed in science.



# STEM BEST®

## BUSINESSES ENGAGING STUDENTS & TEACHERS

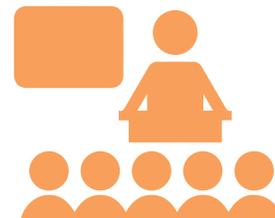
School-business partnerships that provide work-based learning experiences for students.



Thirteen STEM BEST partnerships were established in 2018–2019, involving 21 school districts and 164 community partners. A total of 63 STEM BEST awards have been made since 2014.



Estimated cost-share dollars contributed in 2018-2019 collectively totals to more than \$550,000.



Approximately 1,837 students participated in STEM BEST in 2018-2019.

## STEM BEST EXAMPLES



GRAETTINGER-TERRIL, OKOBOJI AND RUTHVEN-AYRSHIRE SCHOOL DISTRICTS:

These northwest Iowa school districts have cultivated over twenty partnerships to create authentic work-based learning opportunities for their middle school students and have intentions to expand opportunities to high school students.



CAM SCHOOL DISTRICT: Providing students the opportunity to be “work-force” ready and develop their soft skills set has been a wonderful outcome for the students at CAM. The popularity of the course has led to the addition of a section of Digital Media to be offered in the next academic year.



OTTUMWA SCHOOL DISTRICT: The SparkTank Program relies on strong local business ties to form an Advisory Council that provided guidance and assistance leading to a new strand offering, “SparkTank Ignite.” This strand covers multiple career clusters using authentic learning opportunities and allows for a more diverse interest group.

## Microsoft Imagine Academy

A total of 11,578 Microsoft Imagine Academy student certifications have been awarded since 2014. A total of 2,102 certifications were awarded in 2018-2019 plus 83 Microsoft Technology Associate (MTA) certifications. The MTA certification exams are new for IT Infrastructure and Data Science.

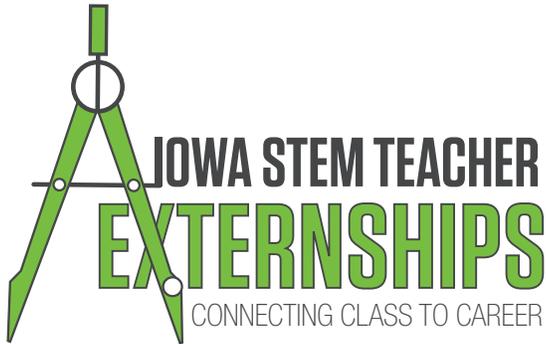
**5** students earned Master Certifications (the top certification available in the program).

**2** students qualified for Nationals in Word and Excel.

**1** teacher earned Microsoft Certified Educator.

**150** high schools and community colleges are participating.

# TEACHER EXTERNSHIPS



Connecting classrooms to careers through the immersion of secondary STEM educators engaged in workplace settings for six weeks in the summer.

Total STEM Teacher Externships  
2009 to 2019

**578**

Total Workplace Partners  
2009 to 2019

**181**

Total approximate cost-share by workplace hosts from 2009 to 2019

**\$891,400**  
(\$129,700 this year)

## 2019 RESULTS:

Of 2019 employers surveyed, most monetized the value of an extern between \$2,500-\$10,000.

Of host employers surveyed in 2019, most valued outcomes included:

- Workplace relevance brought to schools
- Establishment of school-business partnerships
- Increased interest of the future workforce
- Elevated awareness of their business in the community

Top reasons that 2018 teachers gave for participating included:

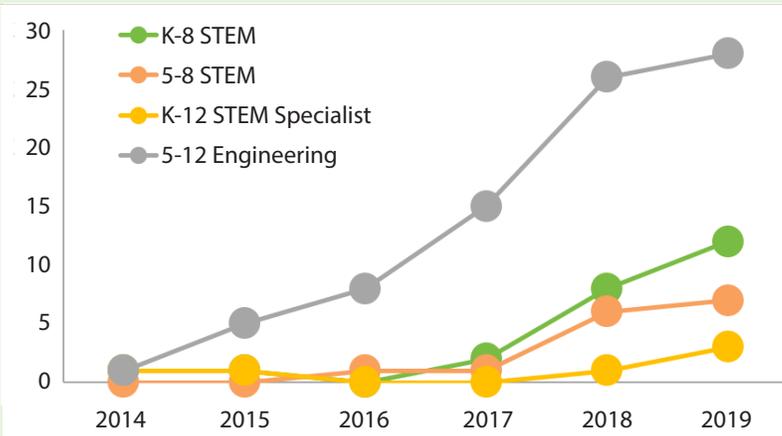
- Bring relevance to content taught in the classroom by seeing how it's used in the workplace
- Summer employment/income
- Learn more about the skills students need in today's workforce
- Make connections in the community

## CHALLENGES AND OPPORTUNITIES

- In science achievement, the average percentage of proficient students in the 2016–2018 biennium period is lower than the 2011–2013 biennium period among 11th grade students.
- Among all students statewide, interest in STEM careers declines steadily from grade 3 to grade 11, a trend more pronounced for females than for males.
- 2018 STEM career interests remain strongly gendered with the top five two-year college majors for females in health-related fields (nursing and radiologic technology), animal sciences, veterinary medicine (pre-vet) and zoology. While for males the top five majors were electrical/electronic engineering, animal sciences, computer engineering technology, computer science and programming and agronomy and crop science.
- The proportions of minority students, those of low socioeconomic status and students with disabilities who demonstrate proficiency are consistently lower than the overall rates. This is true in all biennium periods, all grade levels and in both mathematics and science. Proficiency in science has declined the most among students in the 11th grade who are African-American from 60% in 2011–2013 to 46% in 2016–2018.
- The number of underrepresented minorities in STEM fields is encouraging with a higher proportion of students who are very interested in STEM careers among students who are African-American, Hispanic or Asian compared to white students in grades 3 to 6. However, maintaining that early interest in high school is challenging. The proportion of Asian students who are interested in STEM is maintained, while interest decreases by 7% for white students, 16% for African-American students and 13% for Hispanic students in grade 11.

# STEM TEACHER ENDORSEMENTS

STEM teaching endorsements are now offered at seven institutions in Iowa: Buena Vista University, Drake University, Dordt University, Grand View University, Morningside College, St. Ambrose University and the University of Northern Iowa. A number of other institutions are developing courses in preparation to offer the endorsement. A total of 45 Iowa educators are endorsed in STEM and 80 in engineering.



Since 2014, a total of **125** STEM endorsements have been granted:

- 24** for K-8 STEM
- 15** for 5-8 STEM
- 6** for K-12 STEM Specialist
- 80** for 5-12 Engineering

In 2019, 50 STEM endorsements were granted:

- 12** for K-8 STEM
- 7** for 5-8 STEM
- 3** for K-12 STEM Specialist
- 28** for 5-12 Engineering



**30**

have received the I.O.W.A. STEM Teacher Award since 2015



Most awardees believe the recognition has a lasting effect on students', parents' and colleagues' confidence in their teaching

**21**

programs have earned the Seal of Approval since 2015



Most report that the recognition validates their program or event and helps in grant proposals or other source funding

# STEM COMMUNICATIONS

## SOCIAL MEDIA



Twitter: **3,542** followers  
Up **10%** from last year



Facebook: **1,293** likes  
Up **14%** from last year



Instagram: **386** followers  
Up **47%** from last year



YouTube: **6,100** views  
**37,900** impressions



Newsletter: **6,889** readers  
Up **2%** from last year



LinkedIn: **371** followers  
Up **16%** from last year

Other social media includes Pinterest.

## WEBSITE

[www.iowaSTEM.gov](http://www.iowaSTEM.gov)

**125,585** page views  
Up **9%** from last year

**32,842** new visitors  
Up **21%** from last year



**148** countries



**52** states and territories



**421** lowa cities

## MEDIA COVERAGE

Total PR efforts resulted in **605 placements** in newspaper, television and radio outlets over the course of the year in local, statewide and national media coverage, appearing before potentially **284 million** eyes.

Compared to the previous year (2017-2018), coverage has **increased by 7%**.

**46%** of media coverage included a specific STEM example or story in the state, and **75%** of the coverage mentioned the efforts of the lowa Governor's STEM Advisory Council.

## PUBLIC ATTITUDES AND AWARENESS OF STEM

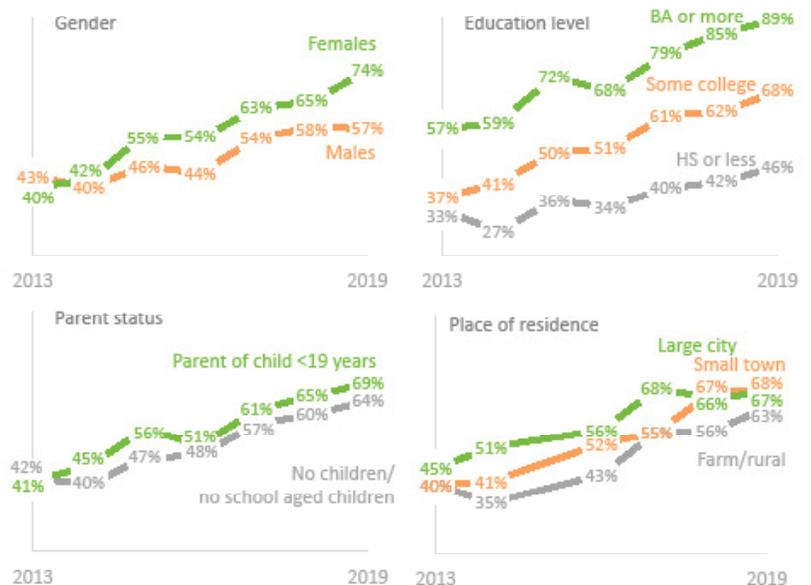
Two-thirds of lowans (66%) had heard of the acronym STEM. This is an increase of 25 percent compared to 2013.

In 2019, 95% of lowans agreed that STEM education should be a priority in their local school district.

Nearly 9 out of 10 support state efforts to devote resources and develop initiatives to promote STEM education in lowa.

Only 58% said STEM education actually is a priority and another 13% said they didn't know if STEM education was a priority in their local school district.

By subject area, approximately 7 out of 10 lowans rated the quality of science, technology and mathematics education in their community as excellent or good.



# IOWA'S STEM NETWORK

## CORPORATE PARTNERS AND INVESTMENTS

**\$1.9 MIL**

A total of **\$1,911,789** in grants, corporate partner gifts and cost-sharing by other STEM partners was invested in Iowa STEM for 2018–2019.

**\$704K**

**48** corporate partners contributed **\$704,042** to Iowa STEM in 2018–2019. Investors are listed at [www.iowaSTEM.gov/corporate-partners](http://www.iowaSTEM.gov/corporate-partners).

**\$116K**

A total of **\$116,992** in grants from the Iowa Department of Natural Resources, the U.S. Department of Labor/Iowa Workforce Development and the National Science Foundation supported Iowa STEM in 2018–2019.

**\$1 MIL**

Cost-sharing partners, including Strategic America, Regional STEM Hub Institutions, STEM Teacher Externship workplace hosts, STEM BEST partners and STEM Scale-Up Program providers contributed **\$1,090,754** to Iowa STEM in 2018–2019.

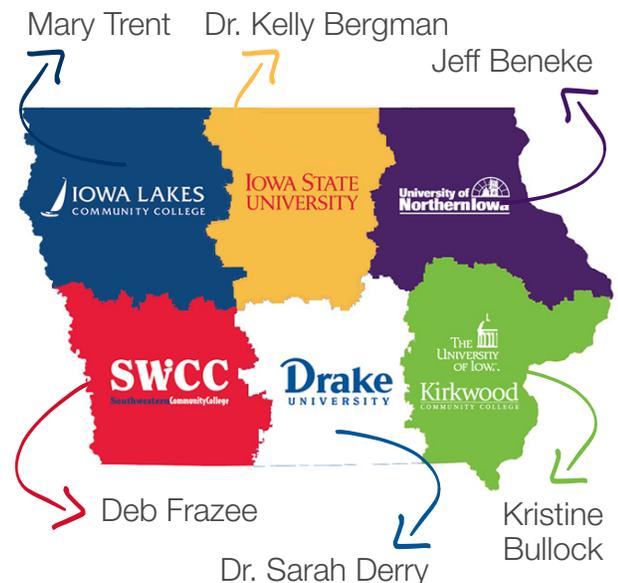
## REGIONAL STEM

Regional STEM managers facilitated 10 STEM Scale-Up Programs that impacted 80,150 preK–12 youth and 1,180 educators in 2018–2019.

Managers held a total of 64 community STEM Festivals across Iowa, engaging approximately 24,000 Iowans in 2018–2019.

Managers made a total of 726 new connections with businesses, workforce development, economic development and formal/informal education leaders.

Collectively, Iowa's Regional STEM managers have 14,307 newsletter subscribers, 5,297 Twitter followers and 2,285 Facebook likes.



## EVENTS

### Governor's 2019 Future Ready Iowa Summit

Hosted by the STEM Council and Future Ready Iowa, this event brought together leaders from business and industry, education, nonprofits, elected officials, students and others to expand access to work-based learning opportunities to help more students prepare for future careers.

- 1,029 Registrants
- 22 General Session Speakers
- 20 Speed Showcase Exhibits
- 21 Sponsors
- 35 Media Outlets Covered the Event

### STEM Day at the Iowa State Fair

The eighth year of STEM Day at the Iowa State Fair covered 5,000 square feet on the Grand Concourse with many exciting demonstrations and hands-on STEM activities for students and families. Held on the last day of the Iowa State Fair, as many as 10,000 Iowans interacted with STEM exhibits throughout the day.

- 23 Exhibits
- 5 Stage Acts
- 359 Volunteers
- 6 Sponsors
- Approximately 5,000 Backpacks Distributed
- 5 Media Outlets Covered the Event



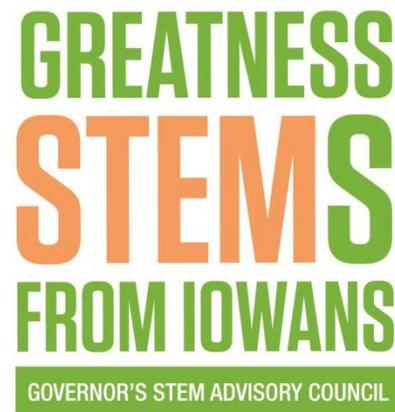
# Iowa STEM Monitoring Project



## 2018-2019 Annual Report

Report No. 7.1  
January 2020

Prepared for  
Iowa Governor's STEM Advisory Council



Prepared by  
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*The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Governor of Iowa, the Iowa Governor's STEM Advisory Council, or The University of Northern Iowa.*

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# Executive Summary

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The Iowa STEM Monitoring Project (ISMP) is a multi-faceted and collaborative effort that works in support of the Iowa Governor's STEM Advisory Council. Established in 2011, the Iowa Governor's STEM Advisory Council works to increase student interest and achievement in STEM (science, technology, engineering and mathematics) subjects and careers through the implementation of high-quality STEM programs for Iowa's prekindergarten through 12<sup>th</sup> grade students in preparation for Iowa's future workforce needs.

The Iowa STEM Monitoring Project is conducted by an external collaboration of partners from Iowa's three Regents institutions: the University of Northern Iowa Center for Social and Behavioral Research, the Iowa State University Research Institute for Studies in Education, and Iowa Testing Programs at the University of Iowa. The purpose of the ISMP is to systematically collect a set of metrics and information sources used to examine changes regarding STEM education and workforce development in Iowa centered on the activities of the Iowa Governor's STEM Advisory Council. The ISMP report is organized into three sections: 1) STEM Scale-Up program; 2) Iowa STEM Indicators, and 3) Statewide Survey of Public Attitudes Toward STEM.

*Section 1. STEM Scale-Up Program* The STEM Scale-Up program provides high-quality STEM education professional development and curriculum to educators in schools, after-school programs, and other settings for youth in grades pre-K through 12. The STEM Scale-Up program is monitored using two sources of information that were expected from all schools/organizations implementing a STEM Scale-Up program: 1) an educator survey, and 2) a student participant list. In 2018-2019, 730 Scale-Up educators completed an educator survey, and 13,585 matched records from Scale-Up student participant lists were used to summarize demographics characteristics of student participants, their interest in STEM-related subject areas and STEM careers, and achievement in mathematics and science.

In 2018-2019, Scale-Up student participants were approximately 48% female and 52% male. The distribution of participants by race/ethnicity was 80% White, 9% Hispanic, 5% Black / African American, and 6% other. Proportionally more students who participated in a STEM Scale-Up program said they were interested in science, technology, engineering, and mathematics, and in working in a STEM career compared to all students statewide. Approximately, 55% of Scale-Up participants said they were *very interested* in technology, and 46% said the same for engineering compared to 45% and 35%, respectively, among students statewide. On the Iowa Statewide Assessment of Student Progress (ISASP), STEM Scale-Up Program participants performed better compared to all students statewide. By an average difference of 2%, a greater proportion of STEM Scale-Up Program participants performed at the Proficient or Advanced level in *mathematics*, *science*, and *English language arts*. Achievement scores by race/ethnicity showed that for minority students, 3% more STEM Scale-Up Program participants met Proficient or Advanced level benchmarks in *mathematics* and 2% more in *English language arts* compared to minority students who did not participate; however, this trend was not observed in *science* achievement among minority students.

Scale-Up educators in both formal and informal education settings reported that they gained skills and confidence in teaching STEM topics as a result of their participation in the Scale-Up programs. The majority of educators agreed or strongly agreed that they now have more confidence to teach STEM topics (94%), have increased their knowledge of STEM topics (95%), are better prepared to answer students' STEM-related questions (93%), and have learned effective methods for teaching in STEM-content areas (95%). Nearly three-quarters of educators reported observing an increase in both student awareness (65%) and interest in STEM topics (82%), while almost 32% stated they observed increased student achievement in STEM areas. In written comments, many educators reported that students experienced an increase in excitement, engagement, and motivation in STEM content areas and that students' attitudes toward STEM topics had changed. They also thought that students had made developments in personal and educational areas such as critical thinking, problem solving, confidence, and perseverance throughout the program. Furthermore, teachers saw improvements to their students' ability to work in groups and collaborate with other students on various STEM-related projects. Most of the educators (90%) reported that they will be using the program with their students again next year.

*Section 2. Iowa STEM Indicators* Iowa STEM Indicators track publicly available data at national and state levels on a variety of STEM topics in education and workforce development across four primary areas of focus: 1) STEM achievement and interest among K-12 students, 2) STEM Preparation of preK-12 students, 3) Post-secondary enrollment and training in STEM fields, and 4) STEM employment.

#### STEM achievement and interest among K-12 students

Indicator 1: In *mathematics* achievement on the Iowa Assessments in the 2016-2018 biennium period (the last year before Iowa changed to the Iowa Statewide Assessment of Student Progress), the average percentage of proficient students was slightly higher than the 2011-2013 biennium period among 8<sup>th</sup> grade students, and was maintained among 11<sup>th</sup> grade students (increasing from 74% to 75% among 8<sup>th</sup> grade, and holding at 82% among 11<sup>th</sup> grade, respectively). Among students who are Hispanic, the proportion meeting proficiency in *mathematics* decreased by three percent among those in 4<sup>th</sup> grade from 2011-2013 to 2016-2018, but increased by four percent for those in 8<sup>th</sup> grade and 11<sup>th</sup> grade .

Increases were also observed in *science* achievement on the Iowa Assessments among 8<sup>th</sup> grade students, from 76% in the 2011-2013 biennium to 83% in the 2016-2018 biennium, but lower among 11<sup>th</sup> grade students (decreasing from 85% to 78%, respectively). One area of concern, proficiency in *science* has declined the most among students in the 11<sup>th</sup> grade who are Black / African American, from 60% in 2011-2013 to 46% in 2016-2018.

Indicator 2: There were losses in the percent of Iowa students in 4<sup>th</sup> and 8<sup>th</sup> grades scoring at or above proficient in *mathematics* on the National Assessment of Educational Progress (NAEP) from 2013 to 2019. In 2019, 42% of students in 4<sup>th</sup> grade and 33% of students in 8<sup>th</sup> grade scored at or above proficient (a net differences of -6% and -3% from 2013, respectively). Notably, there was a four-point increase in average scale scores among 8<sup>th</sup> grade students who are Hispanic

from 2013 to 2019. However, scores for students in 8<sup>th</sup> grade who are Black / African American decreased six-points from 2013 to 2019.

Indicator 3: Student interest in individual STEM topics or in pursuing STEM careers started high in 2012-2013, and has remained high through 2018-2019. This includes 37% of students who were *very interested*, and another 45% who reported they were *somewhat interested* in pursuing a STEM career across all grades combined from elementary, middle school, and into high school.

Indicator 4: Iowa students who took the ACT in 2018 achieved an average STEM score of 21.8, which was higher than the average national STEM score of 20.0. In 2018, 22% of Iowa's graduating seniors who took the ACT met or exceeded ACT STEM benchmarks compared to 20% nationally.

Indicator 5: Overall, nearly half (49%) of students in the 2018 ACT-tested graduating class have an expressed and/or measured interest in pursuing STEM majors or occupations. Among minorities in the 2018 ACT-tested graduating class, 41% of Hispanic students and 40% of Black / African American students have an expressed and/or measured interest in pursuing STEM majors or occupations.

Indicator 6: Among the ACT-tested graduating class in 2018 who aspire to a two-year degree, 2018 STEM career interests remain strongly gendered with the top five two-year college majors for females in health-related fields (nursing and radiologic technology), animal sciences and veterinary medicine (pre-vet), and zoology. While for males the top five majors were electrical/ electronic engineering, animal sciences, computer engineering technology, computer science and programming, and agronomy and crop science.

### STEM preparation of K-12 students

Indicator 7: The percentage of underrepresented minority students enrolled in STEM-subject areas has increased annually in the last five years. Enrollment by underrepresented minority students in *science* has increased by 4.6%, 1.2% in *technology*, 3.2% in *engineering*, 5.2% in *mathematics*, and 3.3% in *health*.

Indicator 8: From 2013 to 2018, the number of students taking Advanced Placement courses in STEM-related subjects increased from 5,355 to 6,527, as well as the number of students who qualified to receive college credit from these courses (from 3,461 in 2013 to 4,155 in 2018).

Indicator 9: In FY2018, a total of 50,001 unduplicated high school students jointly enrolled in community college courses, an increase of 2.3% from FY2017. The number of concurrent enrollment courses taken by high school students has increased each year, with 9,678 mathematics courses and 4,483 science courses taken in 2017-2018.

Indicator 10: Since 2014, a total of 285 endorsements have been granted: 24 for K-8 STEM, 15 for 5-8 STEM, six for K-12 STEM Specialist, 80 for 5-12 Engineering, and 160 for 5-12 CTE

Information Technology. Seven Iowa colleges and universities currently offer the STEM endorsement-Buena Vista University, Dordt University, Drake University, Grandview University, Morningside College, Saint Ambrose University, and the University of Northern Iowa.

#### STEM college completions

Indicator 11: In 2019, 3,819 students enrolled in Iowa's community colleges in degree fields categorized by career clusters in architecture and construction, information technology, and STEM. An additional 11,265 students were enrolled in health sciences. Notably in 2019, awards to minority graduates increased 31% compared to 2013.

Indicator 12: From academic year 2012-2013 to 2017-2018, there has been a 6% decrease in STEM awards at Iowa's 2-year community colleges, a 35% increase at 4-year public, and a 21% 4-year private (not-for-profit) colleges and universities, respectively. Since 2012-2013, approximately 33% of the STEM and STEM-related degrees awarded by Iowa's 4-year public universities were conferred to females, compared to about 20% to females at Iowa's 2-year community colleges, and 37% at Iowa's 4-year, private not-for-profit colleges and universities.

#### STEM employment

Indicator 13: On average in 2018, STEM occupations earned \$32.24 in mean wages and \$67,057 in mean salaries, compared to all occupations overall earning \$21.50 in mean wages and \$44,727 in mean salaries, respectively.

Indicator 14: In 2018, there were an estimated 14,280 vacancies in STEM jobs statewide.

*Section 3. Statewide Survey of Public Attitudes Toward STEM* To assess change in public awareness and attitudes toward STEM, a statewide public survey of Iowans was conducted from May to July 2019. Over 1,000 Iowans participated in a statewide STEM survey, and results were weighted to obtain point estimates that are representative of the adult population of Iowans.

In 2019, 66% of Iowans had heard of the acronym STEM. This was a net increase of +25% from 2013. Iowans with some college education or a college degree, and females were more likely than other groups to have awareness of STEM.

Respondents were also asked about groups and events promoting STEM in the state, as well as awareness of the slogan *Greatness STEMs from Iowans*. In 2019, an estimated 44% of Iowans had heard about a STEM event or programming in their local school district. About three in ten Iowans (30%) reported they had heard of the Governor's STEM Advisory Council or STEM Day at the Iowa State Fair (30%). Almost one in four Iowans had heard of Iowa STEM BEST school-business partnerships (23%), and one in five Iowans had heard of the Governor's STEM Advisory Council (19%). An estimated 19% of Iowans reported having heard the slogan *Greatness STEMs from Iowans*, and 33% recognized *Future Ready Iowa* at the time of the public awareness survey in summer 2019.

In 2019, nine in ten Iowans (95%) said STEM education **should** be a priority in their local school district. Only 58% said STEM education actually **is** a priority and another 13% said they didn't know if STEM education was a priority in their local school district. While there still is a discrepancy between what Iowans' view should be and is a priority, this has improved over time compared to 2015 when less than half (47%) said STEM education was a priority, and one in five (22%) didn't know. Furthermore, nearly nine in ten Iowans (88%) support (56% very supportive and 32% somewhat supportive) state efforts to devote resources and develop initiatives to promote STEM education in Iowa. Iowans were split about sixty to forty in their agreement with the statement "Overall, the quality of STEM education in Iowa is high." Over half of Iowans agreed (59%) or strongly agreed (5%) with this statement, 25% disagreed or strongly disagreed (the remainder neither agreed or disagreed, or didn't know). By subject area, seven in ten Iowans rated the quality of science, technology, and mathematics education in their community as *Excellent* or *Good*, while just less than half (48%) of Iowans rated the quality of engineering education in their community that way.

*Conclusion* The data compiled, collected, and synthesized for this report come from a variety of sources. Educators in both formal and informal education settings reported that they gained skills and confidence in teaching STEM topics as a result of their participation in the STEM Scale-Up programs, and proportionally more students who participated in a STEM Scale-Up program said they were interested in science, technology, engineering, and mathematics, and in working in a STEM career compared to all students statewide. Following the benchmarks established in 2012-2013, 2018-2019 showed small but measureable gains in some indicators and some losses in others. In addition, six in ten Iowans have now heard of STEM. The ISMP will continue to follow these indicators, identify and/or refine other metrics of STEM progress, and strengthen relationships with other data partners in the state. Taken together, this report provides a picture of Iowa's STEM landscape, and how it is evolving following the targeted initiatives of the Iowa Governor's STEM Advisory Council to improve STEM education and workforce development surrounding STEM in Iowa.

# Section 1. STEM Scale-Up program

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The STEM Scale-Up program provides high-quality STEM education professional development and curriculum to educators in schools, after-school programs, and other settings for youth in grades pre-K through 12. More information about the STEM Scale-Up Programs can be found at [www.iowastem.gov/Scale-Up](http://www.iowastem.gov/Scale-Up).

The STEM Scale-Up program is monitored using two sources of information that were expected from all schools/organizations implementing a STEM Scale-Up program: 1) an educator survey, and 2) a student participant list.

## STEM Scale-Up Educator Survey

**Data source** Educator Survey, Iowa STEM Monitoring Project  
Provided by Research Institute for Studies in Education, Iowa State University

The Educator Survey is collected annually from teachers and other informal educators who implement Scale-Up programs in their schools and organizations. In 2018-2019, data were collected across all six STEM regions of the state and for the following ten Scale-Up programs<sup>1</sup>.

- Curriculum for Agricultural Science Education (CASE) – Agricultural Power and Technology (awarded in 2017-2018)
- Curriculum for Agricultural Science Education (CASE) – Animal Plant Biotech\*
- Curriculum for Agricultural Science Education (CASE) – Environmental Science Issues\*
- Computer Science Principles\*
- Engineering Everywhere\*
- Making STEM Connections
- Pint Size Science\*
- PowerTeaching Math
- Project Lead The Way (PLTW): Computer Science for Innovators and Makers
- Ramps and Pathways
- STEM in Action\*

\*New program in 2018-2019.

<sup>1</sup> Curriculum for Agricultural Science Education: Agriculture Power and Technology was awarded as a Scale-Up program in 2017-2018, but was evaluated in 2018-2019. Curriculum for Agricultural Science Education: Animal Plant Biotech and Environmental Science Issues were awarded as Scale-Up programs in 2018-2019, but will be implemented in 2019-2020 and reported in the FY20 annual report.

## Scale-Up program awards

A total of 1,180 Scale-Up program awards were made in 2018-2019 (Table 1). According to records provided by the Iowa Governor’s STEM Advisory Council, Office of the Executive Director, over 80,000 preK-12 students participated in the 2018-2019 Scale-Up programs (Table 2). Using the projected participation numbers provided in the application materials of those schools and organizations who received an award, an estimated 32,000 students participated in the Making STEM Connections program, 19,000 in STEM in Action, almost 13,000 in Pint Size Science, approximately 7,500 in Ramps and Pathways, and around 3,200 students participated in Project Lead the Way program. Additionally, PowerTeaching Math attracted 1,700 students, and Engineering Everywhere enrolled about 1,500. Fewer than 1,000 students participated in each of the remaining programs.

Table 1. Number of educators awarded Scale-Up programs by region, 2018-2019

Scale-Up Program	Total	Number by STEM Region					
	n	NW	NC	NE	SW	SC	SE
Total	<b>1,180</b>	<b>188</b>	<b>184</b>	<b>177</b>	<b>251</b>	<b>212</b>	<b>168</b>
CASE - Animal and Plant Biotechnology	10	2	2	1	2	2	1
CASE - Environmental Science Issues	11	1	4	1	2	2	1
Computer Science Principles	26	3	2	3	2	4	12
Engineering Everywhere	22	2	4	2	7	4	3
Making STEM Connections	288	45	45	27	63	61	47
PLTW Computer Science for Innovators and Makers	28	2	4	5	5	5	7
Pint Size Science	323	54	44	72	64	51	38
PowerTeaching Math	13	1	2	0	3	4	3
Ramps and Pathways	147	23	26	30	23	20	25
STEM in Action	312	55	51	36	80	59	31

Source: Iowa Governor’s STEM Advisory Council, Office of the Executive Director

Note: Awards for CASE: Agriculture Power and Technology were reported in 2017-2018 report.

Table 2. Projected number of students participating in Scale-Up programs by region

Scale-Up Program	Total	Number by STEM Region					
	n	NW	NC	NE	SW	SC	SE
Total	<b>80,150</b>	<b>12,808</b>	<b>10,374</b>	<b>10,974</b>	<b>9,727</b>	<b>14,467</b>	<b>21,800</b>
CASE - Animal and Plant Biotechnology	360	50	60	15	155	40	40
CASE - Environmental Science Issues	385	20	233	50	28	24	30
Computer Science Principles	756	172	112	90	43	70	269
Engineering Everywhere	1,576	228	360	85	328	235	340
Making STEM Connections	32,296	6,361	3,028	3,158	3,683	4,613	11,453
PLTW Computer Science for Innovators and Makers	3,244	80	400	680	278	784	1,022
Pint Size Science	12,839	1,443	1,741	2,820	2,318	1,368	3,149
PowerTeaching Math	1,712	120	220	0	95	500	777
Ramps and Pathways	7,692	605	1,028	1,717	492	1,671	2,179
STEM in Action	19,290	3,729	3,192	2,359	2,307	5,162	2,541

Source: Iowa Governor’s STEM Advisory Council, Office of the Executive Director

Note: Awards for CASE: Agriculture Power and Technology were reported in 2017-2018 report.

### Descriptive information about the educator survey

In 2018-2019, 1,085 Scale-Up educators were sent an email invitation to complete an educator survey. Valid surveys were completed and returned by 769 educators (71% response rate). Respondents were educators of preschool, elementary school, middle school, and high school students in school districts across Iowa, and informal educators from organizations such as extension and outreach, day cares, after school programs, and libraries. Seventy-nine percent of the respondents identified themselves as in-school educators, eight percent of educators responded that they were out-of-school (informal) educators, three percent were curriculum coordinators, one percent were school administrators, and one percent were para-educators.

Overall, the six regions were well represented. Seventeen percent of the respondents represented the Northwest region, 16% represented the North Central region, 19% represented the Northeast region, 16% represented the Southwest region, 17% represented the South Central region, and 16% represented the Southeast region.

Respondents most often implemented STEM in Action (28%), Pint Size Science (27%), Making STEM Connections (22%), and Ramps and Pathways (13%). Five percent or less implemented each of the remaining programs.

## Key Findings

### Pre-implementation professional development for Scale-Up educators

To prepare for implementing the Scale-Up programs, educators were required to complete a professional development workshop. When asked whether they completed the required professional development workshop, 97% of educators reported that they had. The three percent who reported that they did not complete the required professional development workshop described that they had conflicts with scheduling (though some sent another team member in their place), medical leave, a sick child, they had done the training before, or that the training had not yet been offered.

The Ramps and Pathways Scale-Up program required a second professional development session after receiving program materials. Among educators participating in this program, 93% completed the second professional development session. Of those who did not complete the second session, reasons for their absence included that they were not aware of it, did not remember it, or that they or their kids were sick.

Additionally, educators participating in the Making STEM Connections, Pint Size Science, and STEM in Action programs were offered optional webinars. Fourteen percent viewed all of the webinars that were offered, 42% viewed some of them, and 44% did not view any of them.

Educators participating in the Making STEM Connections, Pint Size Science, and STEM in Action programs could also opt to receive undergraduate, graduate, or CEU credit for their participation in their program's professional development. About a quarter of these educators received some form of credit. Among educators who did not receive credit, 13% did not because they were not aware that it was an option, while 61% were aware of the option but chose not to pursue the credits.

Most educators (90%) reported that the professional development had met or exceeded their expectations overall (Figure 1). In particular, they noted that the preparation of the trainer and their ability to answer questions met or exceeded expectations. Between 9-11% indicated that the training fell short of their expectations with regards to what to expect when implementing the program, confidence that they could implement the program, and knowledge about the support that they would receive during implementation. Additionally, around eight percent of educators thought that training fell short of their expectations with regards to targeting the program to the appropriate grade level and preparing them to implement their Scale-Up programs.

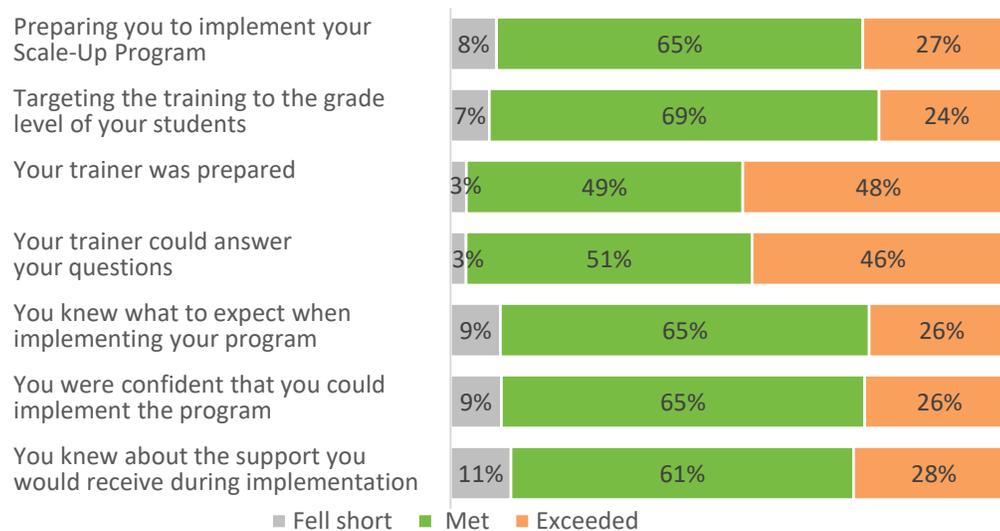


Figure 1. Educator views on how well their expectations were met regarding professional development

### Program Implementation

Educators indicated whether they implemented their STEM Scale-Up programs as intended, with minor or major changes, or not at all. Of the responding educators, 60% implemented their programs as designed. Additionally, about 30% implemented the program with minor changes, 6% implemented their program with major changes, and two percent planned to implement in the summer.

Among those who reported minor (30%) or major (6%) changes to programs described modifications due to time constraints, late arrival of or insufficient materials, altering the program to fit the curriculum, lack of physical space to implement some programs, and supplementing the program with additional materials. Additionally, educators adjusted lessons to fit the age and ability of their students, the size of their classroom, as well as their school’s curriculum. Several educators also mentioned that they frequently did not follow lesson plans, instead allowing students to explore the materials.

Three percent of educators reported that they did not implement their programs. Several of these educators reported that they plan to implement next year. Other educators indicated that they did not implement this year because of limited time, having been on maternity or sick leave, the implementation of new science curricula at their schools, or that the training had not yet taken place. A few educators also indicated that communication breakdowns in their school left them unaware that the materials had arrived.

Most educators reported a positive experience working with their Scale-Up service providers (Figure 2). They indicated that they had at least some of the time: engaged with the service provider (79%), received materials and resources in a timely manner (95%), the service provider was responsive to questions and needs (97%), and the partnership met their overall expectations (96%).

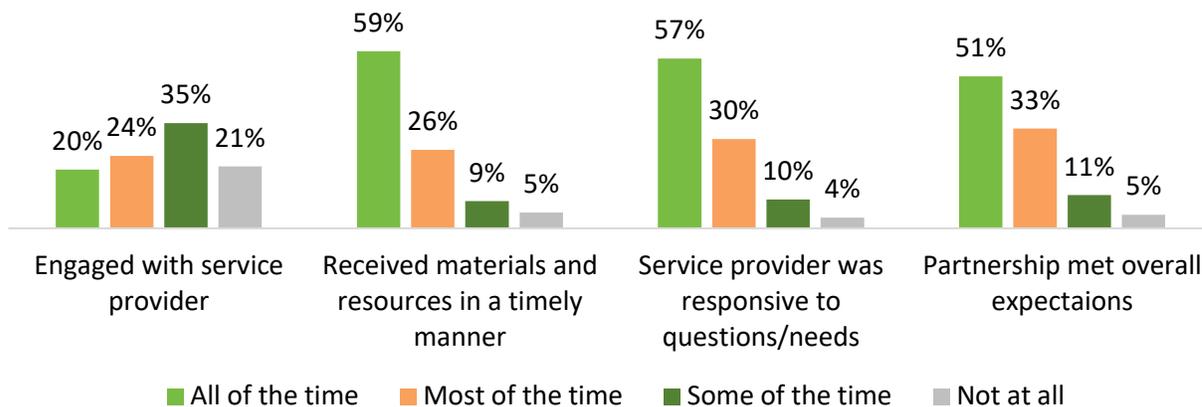


Figure 2. Educator experiences with service providers

Twenty percent (20%) of the educators reported challenges or barriers they faced in working with their service provider. Around half of the educators (53%) did not report any challenges in working with their service providers, and approximately one-fourth (27%) indicated that they did not contact their service provider.

Six percent of educators indicated that the training did not adequately prepare them to implement the program and that reimbursements of expenses from the service provider were late or not made at all. Five percent reported that responses to communications were not made in a timely manner, and three percent of educators indicated that they did not know who their service provider was and that it was difficult to navigate the program’s website to find the information they needed. Less than one percent of respondents responded that the service provider could not sufficiently solve their software or equipment malfunctions. An additional seven percent reported that they faced other challenges or barriers in working with service providers. Several of these educators had difficulty obtaining materials from the service provider, and these materials were often late, missing pieces, and/or broken. Others mentioned that they did not have enough materials for the entire class. A few educators also expressed confusion regarding the requirements for earning graduate credits through the program.

Approximately 43% of educators reported that they did not encounter any challenges or barriers with implementation. The most common challenges that educators did face were related to time, with 26% responding that they did not have enough time to implement the entire programs, and 20% indicating that it took more time than they expected to plan, prepare, or set up the lessons and activities. The next most common challenges or barriers that educators faced were that they received materials or information late (nine percent), did not have enough materials for their students (seven percent), the program was too advanced for their students (six percent), they were not familiar enough with the

program or did not know enough about the topics to teach it properly (six percent), the instructions or lesson plans were difficult to understand (six percent), and the quality of some of the provided materials did not meet expectations (five percent).

Educators were asked what, if anything, they would recommend to other educators implementing a Scale-Up program. About half (49%) recommended preparing materials early and planning that the program implementation will take extra time, and 41% recommended seeking advice from other educators who have used the programs. Thirty-six percent (36%) suggested breaking up classes into smaller groups, and about one-third of the educators (34%) recommended using resources provided by the program. Further, 20% of educators suggested providing models or other supplemental materials for students, 16% said to contact service providers with questions or when there are challenges, and 13% suggested reaching out to others, such as school administrators, industry partners, community members and parent volunteers, and/or colleges and universities, to help implement the program. Other recommendations included determining what supplies are included in the kits before ordering, learning about and using the materials before utilizing them in the classroom with students, and providing sufficient time for students to explore the materials.

### Outcomes and impacts of the 2018-2019 Scale-Up Programs

Educators reported that they gained skills and confidence in teaching STEM topics as a result of their participation in Scale-Up programs. The majority of educators agreed or strongly agreed that they now have more confidence to teach STEM topics (94%), have increased their knowledge of STEM topics (95%), are better prepared to answer students' STEM-related questions (93%), and have learned effective methods for teaching in STEM-content areas (95%).

Most of the educators (90%) reported that they will be using the program with their students again next year. Many educators reported that they plan to use the program again with their students as the program was designed. Other educators specified different ways that they would implement the program, including using the program as a supplement to their curriculum, adding additional modules or units, or offering as after-school programs, camps, or clubs. Many discussed embedding programs within existing classroom activities, often working across disciplinary lines. Some educators specified that they would only have the program available during certain times of the school day by implementing the program into a subject area, designated space, or during center time. Some teachers mentioned expanding the program to include different groups of students including additional grade levels.

Of the educators who did not plan to use the program again next year (10%), the most common reason was that they were leaving their position/grade level, moving to a new school, or retiring. Educators who plan to remain in their current position reported that the program was expensive or required too much time as their reasons for not implementing the program next year. Other reasons included that they were not working with an instructional coach next year, their school was moving to a new curriculum, or they will implement every other year because of multi-age classrooms.

Although not a specific requirement of Scale-Up educators, around 30% percent of respondents indicated that they connected their Scale-Up program with a business or industry. The most popular ways in which educators made these connections included having business partners discuss STEM careers and opportunities with students (15%), helping students design or build their projects (eight percent), providing guest speakers (seven percent), and providing specific materials or resources for students (seven percent). Other activities provided by business partners included supplying them with additional funding, organizing and attending STEM events and family nights, informing students about opportunities, and evaluating student projects.

Educators observed that their students benefitted from their Scale-Up program participation. From a list of potential student outcomes, 82% of the educators reported observing increased student interest in STEM topics, and 65% reported increased student awareness in STEM topics (Figure 3). Approximately 32% of educators observed increased student achievement in STEM topics, 24% reported increased student awareness in STEM career opportunities, and 19% observed increased student interest in STEM career opportunities. Eleven percent (11%) reported increased interest in post-secondary STEM opportunities. Ten percent of educators (10%) described other observable student outcomes, including increases in students’ engagement, critical thinking and problem-solving skills, abilities to work with others, and understanding of important STEM-related concepts and ideas. Several educators also observed an increased awareness of and interest in STEM among other educators and students’ families.

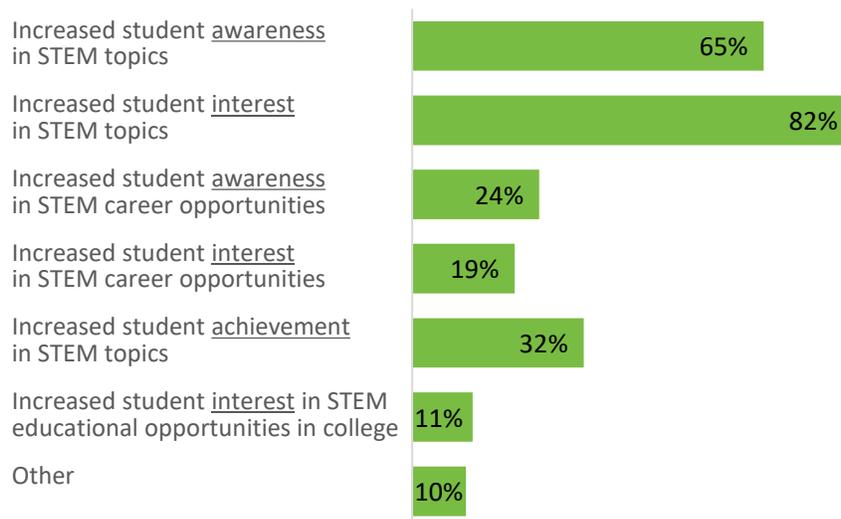


Figure 3. Observed student outcomes of the Scale-Up programs

In an open-ended question, 593 educators provided examples of the perceived impact the programs had on their students. These comments were themed and categorized into three overarching categories, each with its own subcategories of responses. Comments related primarily to:

1. **Impacting STEM Education**, which included: building critical thinking skills; enhancing students' understanding of, confidence in, and enthusiasm for STEM; expanding opportunities with science and technology, increasing participation among STEM teachers, parents, and the community; providing practical, hands-on experience; and raising interest in STEM careers and educational opportunities.
2. **Increasing Student Engagement, Motivation, and Opportunities for Collaboration**, which included: creating opportunities for teamwork and collaboration, enhancing student engagement and motivation, forming connections for interdisciplinary learning, and individualizing student learning.
3. **Enhancing Teachers' Skills and Classroom Curriculum**, which included cultivating teachers' skills and improving classroom curriculum/materials and aligning with current standards.

Exemplar quotations for each theme and subcategory related to the impact of the Scale-Up programs are provided below. Many comments related to more than one theme – in this case, a predominant theme was identified and the quote was categorized accordingly. Quotes have minor edits for spelling and clarity.

#### Impacting STEM Education

##### *Building critical thinking skills, problem-solving skills, and opportunities for creativity*

- *My students were engaged in difficult and unfamiliar science and engineering topics and learned the material. They demonstrated perseverance over multiple days' work with a problem. There was an authentic purpose to their work. They looked forward to science and enjoyed themselves. They demonstrated 100% mastery of the science and engineering process standard at the end of grade 1.*
- *The students were able to think more critically and creatively with persistence. They were able to develop problem solving and critical thinking skills. The students worked together, so they were able to build cooperation skills as well as build a community among themselves.*
- *The program opened up new opportunities to be makers and problem solvers. Students had experiences with coding, circuits, and creating that I have never been able to offer. The program creates a rich environment for questioning, exploring and presenting that engages all students at every level.*

##### *Enhancing Students' Understanding of, Confidence in, and Enthusiasm for STEM*

- *This was a very user-friendly model to use in the classroom that really helped the kiddos get excited about their learning, more specifically learning related to STEM. It was a great way to amp up my instruction at the cognitive level focusing on skills such as problem solving, collaboration, and engagement.*
- *I was able to bring literature into my science curriculum. The students were more engaged and excited about learning science content. I was able to teach more STEM skills and content.*
- *The students increased their knowledge of STEM topics and their thirst to learn more about STEM topics.*

### *Expanding Opportunities with Science and Technology*

- *Provided us with the resources needed to implement new STEM related classes, activities and camp offerings. Also gave us a wealth of ideas for STEM programming. Provided a starting point for building an open access Maker Space in the Recreation Center, which is still a work in progress.*
- *My students have learned so much more about technology than I would have been able to provide without this program.*
- *It all started with the Makedo Kit we received. I have my student make a house from a cardboard dryer box. It went on for 5 months and was amazing! I have shared this PBL and this Scale-Up Program with schools all over the U.S. This was the best thing that I have ever done as a teacher in my 16 years of teaching!*

### *Increasing participation among STEM teachers, parents, and the community*

- *This program filled a gap in my library's STEM offerings for our youngest age group (specifically, preschoolers). The kids have been excited about all of the hands-on activities and their parents are thrilled, too. This program has brought in new library patrons.*
- *This is an outreach and we go to the school to do the programs monthly. The teachers, students and the parents all love the Pint Size Science Program.*
- *It was easy to implement instructional workshops, half hour activities at 4-H meetings and after school programming.*

### *Providing Practical Hands-on Experience*

- *The students liked the hands on experience. They asked a lot of good questions. It gets them interested in things they never thought about before.*
- *It was a fun and creative way to teach STEM to the students. They love the hands-on activities, and they loved getting to design and create things all on their own.*
- *Students enjoyed the hands on experience provided by the program. Students were engaged in using materials, many of which they had never seen/used before.*

### *Raising Interest in STEM Careers and Educational Opportunities*

- *This helped students become future ready Iowans with knowledge of STEM and STEM careers.*
- *Students who attend the library's STEM programs have developed more of an interest in STEM & how they can use STEM in future careers.*
- *It gave them an opportunity to see what STEM classes and careers are out there for them in their future.*

### *Increasing Student Engagement, Motivation, and Opportunities for Collaboration*

#### *Creating Opportunities for Teamwork and Collaboration*

- *Ramps and Pathways has had many positive effects in my classroom, in addition to the high level learning in math and physical science. The most important thing in an early childhood setting is the development of social/emotional skills. Playing (working) at the "Engineering Center" provided many opportunities for kids to collaborate and share ideas, respect for others' work and spatial boundaries, develop persistence, and resolve social problems. As we arrive closer to the end of the school year, I know that these open ended materials helped to develop creativity, and high-level problem solving skills.*
- *It helped my students learn to communicate and work together in a group. My behavior students were more involved and had fewer issues.*
- *Using the STEM Scale-Up program my students learned how to work together a team and recognize that everyone has an important part in the classroom.*

### *Enhancing Student Engagement and Motivation*

- *The program has been very successful at getting our students excited about STEM and all the fun things that can go along with it! Each lesson we tried the kids were excited and engaged and couldn't wait to do more!*
- *Students enjoyed learning about the topic and were able to remember the information and use what they learned to apply it to their model.*
- *Students really enjoyed the program. The students really became interested and curious. They asked questions that branched off of the project.*

### *Forming Connections for Interdisciplinary Learning*

- *It helped me realize that 3-4 year olds can participate in STEM activities and STEM is all around us and doesn't have to be a separate time slot in the day but can be incorporated all day long.*
- *Throughout the year students were making connections to various STEM topics in the reading curriculum and in other content areas. Often times, students would comment that something from the content being covered "would make a good STEM challenge".*
- *This Scale-Up program gave me access to make connections with science and history. I now have the telegraph machines and the optic fiber cable to do more experimenting in the future, which my students are very excited about trying other ideas.*

### *Individualizing Student Learning*

- *The girls in my preschool classes, as well as my Hispanic students, really took off with being exposed and experiencing the STEM program. Their verbal skills enhanced, as well as their knowledge in science, problem solving, etc.*
- *I found students who thrived under this knowledge, who struggle under other traditional areas of study. This boosted their confidence and their whole demeanor about school changed.*
- *It let all kids shine in their own way. There were special ed kids, that some people write off, that did extremely well with the hands on activities and many kids came up with ideas that adults will never think of.*

### *Enhancing Teachers' Skills and Classroom Curriculum*

#### *Cultivating Teachers' Skills*

- *It gave me a positive science curriculum that I felt comfortable implementing, because I had been trained very well in it. It gave ME confidence, confidence that I did not believe I could obtain. Thank you!*
- *The Scale-Up program offered so much support to make teaching in an unfamiliar field for me very easy. The trainings were all applicable and informative, increasing both my own knowledge of CS but also introducing many ways to deliver instruction.*
- *The STEM Scale-Up program is an excellent way to provide training and materials to the preschool classroom. The topics are fun, engaging, and essential to the development of young children. I deeply appreciate being a part of this program. It helps me stay motivated and excited to be an early childhood educator.*

#### *Improving Classroom Curriculum/Materials and Aligning with Current Standards*

- *Ramps and Pathways has been a positive addition to the preschool classroom. Non-profit daycare centers run on a very limited budget; when these types of curriculum and materials are made available along with professional development, it makes a dramatic impact on the ability of the teacher to keep up with changing curriculum needs of the students.*
- *These kits were easily designed for me to teach STEM related to the Next Generation Science Standards. They were amazing!*
- *Unit was complete with materials, instructions and lined up perfectly with science standards. It enriched our unit, allowing for hands on learning, deeper classroom discussions and group collaboration.*

## STEM Scale-Up student participants

**Data Source** Student Participant Lists, Iowa STEM Monitoring Project  
Provided by Iowa Testing Programs, University of Iowa

### Key findings

In 2018-2019, there were 26,161 students listed on student participant lists submitted to Iowa Testing Programs, of which 13,585 had matches to Iowa Statewide Assessment of Student Progress (ISASP) regardless of STEM Interest Inventory participation (52% match rate). Of these, 48% were females and 52% males. The distribution of students by race/ethnicity was 80% White, 9% Hispanic, 5% Black/African American, and 6% Other.

### STEM Interest among Scale-Up students versus students statewide

The proportion of Scale-Up participants expressing interest in STEM subjects and careers was compared to the proportion of students statewide that expressed interest.

- In 2018-2019, a higher percentage of students who participated in STEM Scale-Up programs said *I like it a lot* (Grades 3-5) or were *Very interested* (Grades 6-11) in STEM subjects, in pursuing a STEM career, and in working in Iowa after graduation compared to all students statewide (Figure 4).
- The percent of students who said they were *very interested* in having a STEM job was 39% of Scale-Up program participants compared to 37% of students statewide.
- The percent of students who said they were *very interested* in working in Iowa was 46% of Scale-Up program participants compared to 37% of students statewide.

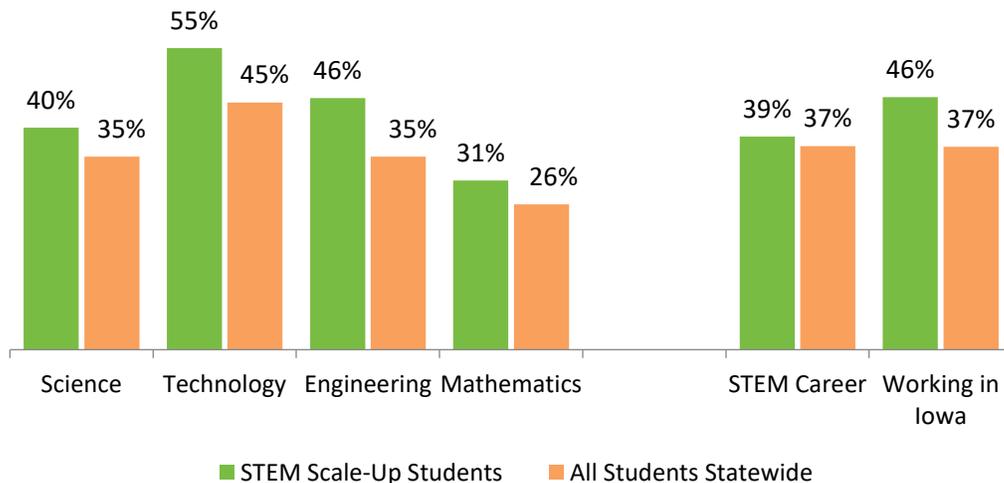


Figure 4. STEM Interest among Scale-Up students in Grades 3 through 11 versus students statewide, 2018/19

- For students in Grades 3-5 and Grades 6-8, interest in STEM topics and STEM careers between Scale-Up participants and students statewide is very similar (Figure 5 and Figure 6, respectively).
- For Grades 9-12, students participating in Scale-Up programs showed more interest in STEM topics and STEM careers than students statewide (Figure 7).

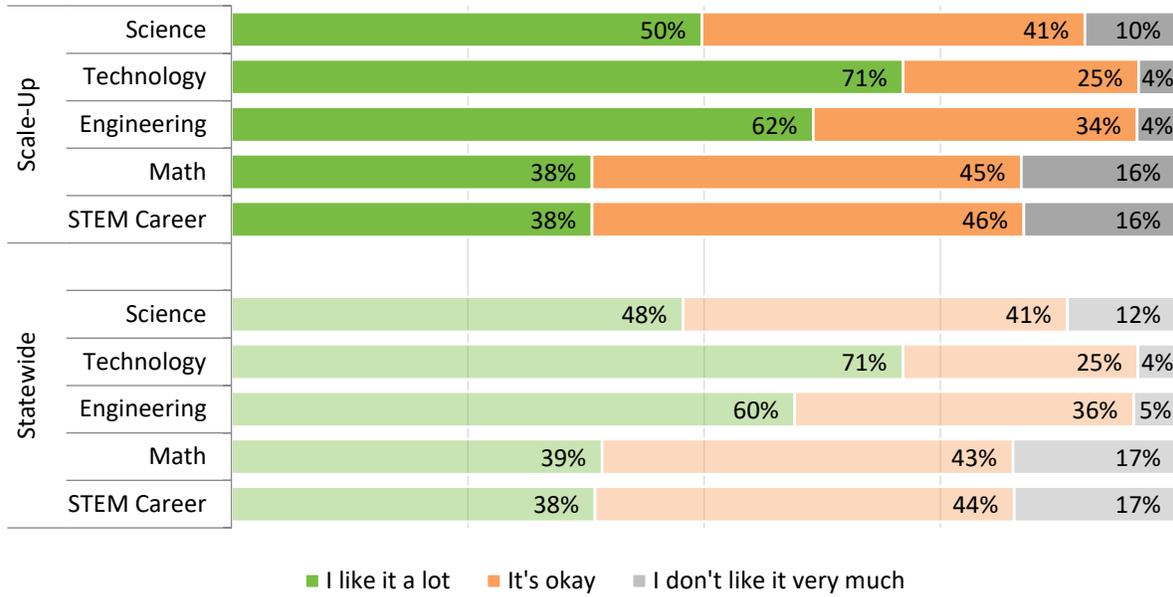


Figure 5. Interest in STEM topics and careers for Grades 3-5 Scale-Up students and students statewide, 2018/19

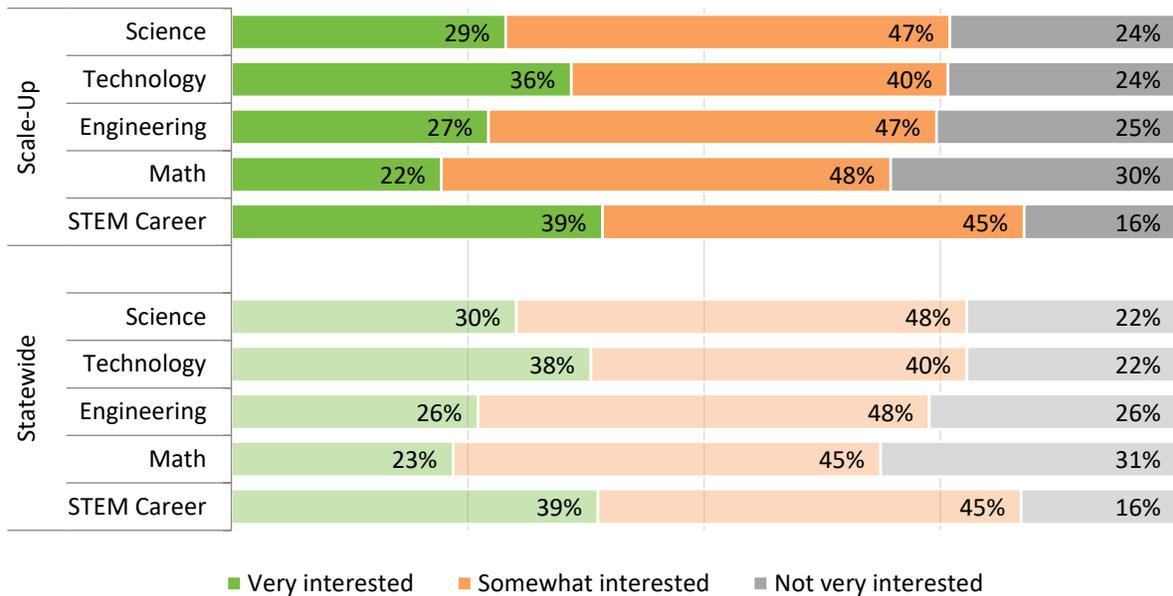


Figure 6. Interest in STEM topics and careers for Grades 6-8 Scale-Up students and students statewide, 2018/19

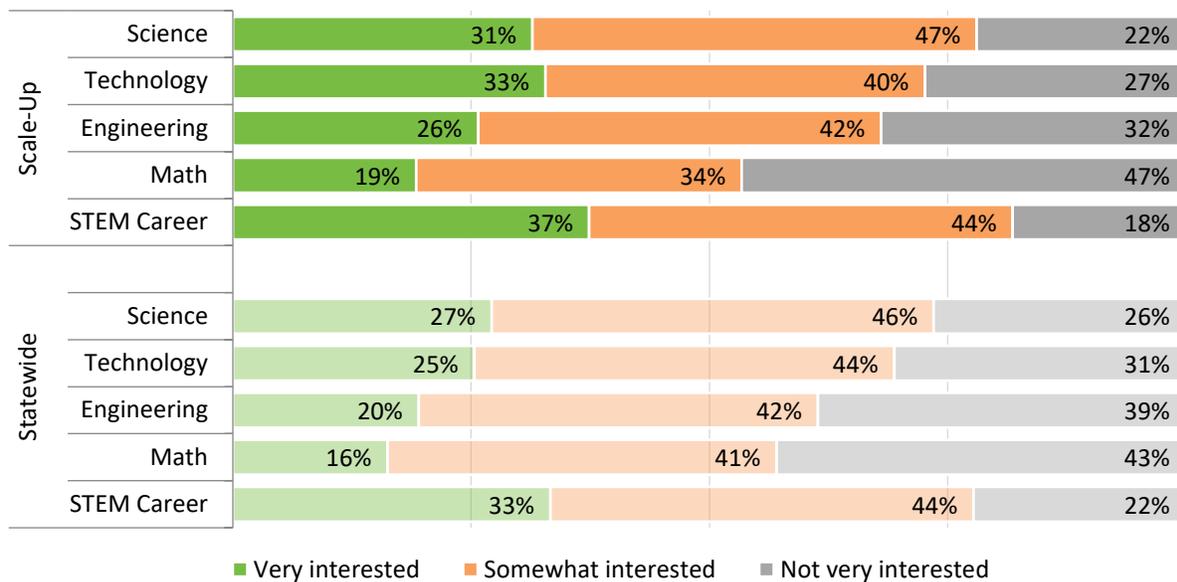


Figure 7. Interest in STEM topics and careers for Grades 9-11 Scale-Up students and students statewide, 2018/19

[Achievement in mathematics, science, and English language arts on the Iowa Statewide Assessment of Student Progress \(ISASP\), Scale-Up students versus statewide comparison](#)

In 2018-2019, the state of Iowa implemented new standardized assessments, the Iowa Statewide Assessment of Student Progress (ISASP). This is a substantial change in the evaluation methods compared to 2017-2018 and years' prior when Iowa Assessments were used to compare Scale-Up student achievement. The ISASP was administered from March 16 to May 15, 2019 and was available in online (new) and paper formats. ISASP assessments in *mathematics* and *English language arts* are given annually to students in 3<sup>rd</sup> through 11<sup>th</sup> grade; while the *science* assessment is only administered to students in 5<sup>th</sup>, 8<sup>th</sup>, and 10<sup>th</sup> grade. Students who participated in a STEM Scale-Up program were compared to students statewide with regard to achievement in *mathematics*, *science*, and *English language arts*. The *English language arts* component is a modification to the reading comparisons used in previous years. ISASP scores in these subjects were compared using percentage of students performing at Proficient level or above. This is different metric from comparisons of National Percentile Rank on the Iowa Assessments used in previous reports, and does not allow for comparisons of trends over time with previous years' evaluation results. In addition, comparisons reflect association between Scale-Up Programs and achievement, not causation.

- In 2018-2019, STEM Scale-Up Program participants performed better on the Iowa Statewide Assessment of Student Progress (ISASP) compared to all students statewide. By an average difference of 2%, a greater proportion of STEM Scale-Up Program participants performed at the Proficient or Advanced level in *mathematics*, *science*, and *English language arts*. (Figure 8).
- In nearly all grades, a greater proportion of STEM Scale-Up Program participants performed at the Proficient or Advanced level *mathematics* (Figure 9), *science* (Figure 10), and *English language arts* (Figure 11) on the ISASP compared to all students statewide.

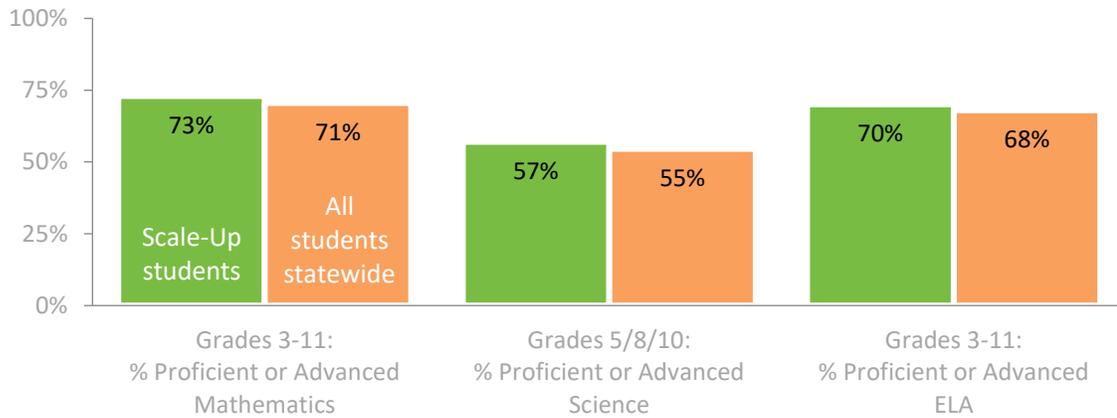


Figure 8. Percent meeting benchmarks at or above Proficient level, Scale-Up students v. all students statewide, 2018/19

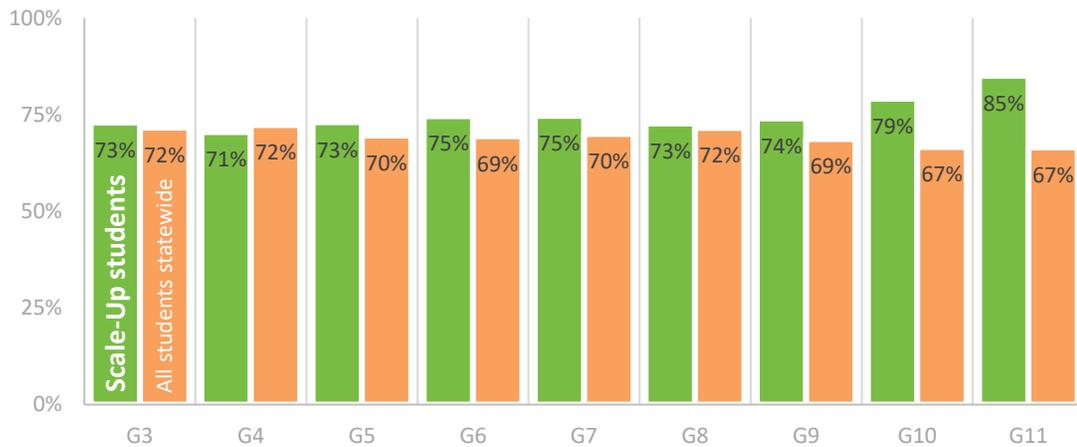


Figure 9. Percent meeting benchmarks at or above Proficient in *Mathematics* by grade level, Scale-Up students v. all students statewide, 2018/19



Figure 10. Percent meeting benchmarks at or above Proficient in *Science* in Grades 5/8/10, Scale-Up students v. all students statewide, 2018/19

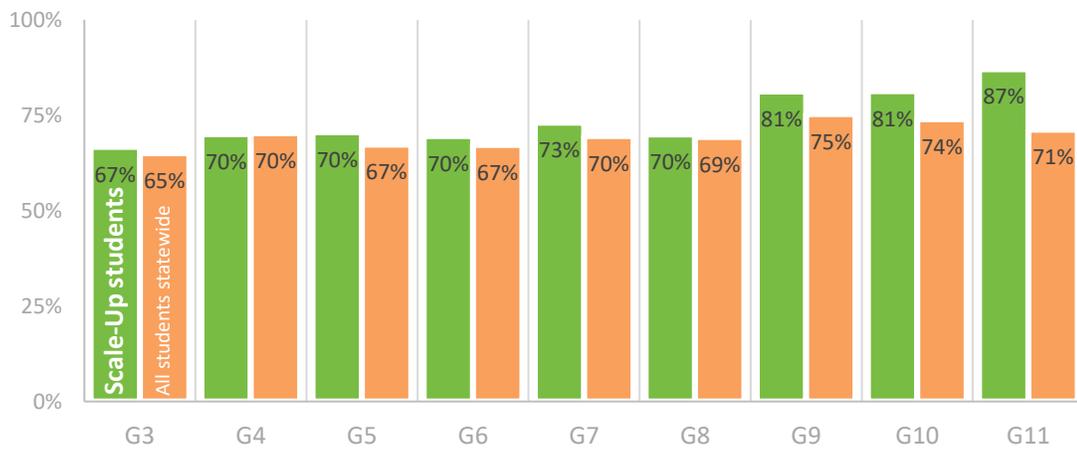


Figure 11. Percent meeting benchmarks at or above Proficient in *English language arts* by grade level, Scale-Up students v. all students statewide, 2018/19

- For minority students, 3% more STEM Scale-Up Program participants met Proficient or Advanced level benchmarks in *mathematics* and 2% more in *English language arts* compared to minority students who did not participate; however, this trend was not observed in *science* achievement (Figure 12). (Minority students are aggregated scores of all non-white STEM Scale-Up students due to small sample sizes in subgroup analysis).

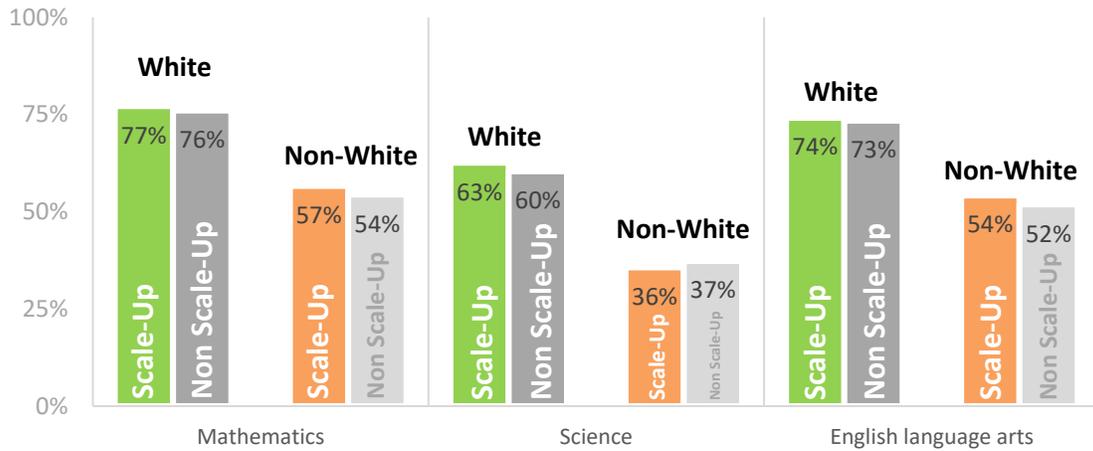


Figure 12. Percent of students performing at Proficient level or above, White versus non-White students in Grades 3 through 8 by STEM Scale-Up program participation, 2018/19

## Section 2. Iowa STEM Indicators

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The Iowa STEM Indicators track publicly available data at the national and state level. The purpose of the indicators is to provide annual benchmarks on a variety of STEM topics in education and economic development by systematically assessing the progress and condition of the state's STEM landscape. The indicators fulfill the need for benchmarks related to a variety of domains in the area of STEM education and workforce development.

Iowa's STEM indicators are organized across four primary areas of focus: 1) STEM achievement and interest among preK-12 students, 2) STEM Preparation of preK-12 students, 3) STEM college completions, and 4) STEM employment (Table 3). All indicators are reviewed each year for data quality and utility in providing useful benchmarks to the Council. In addition, new or updated indicators are explored as other data and data sources are identified or in response to targeted activities or policy interests by the Council. No changes were made to the indicators for 2018-2019.

When possible, the indicators are compared across demographic, geographic, and other characteristics of respondents. Data used to track Iowa's STEM indicators are publicly available and come from sources such as the Iowa Department of Education, the National Center for Education Statistics (NCES), Iowa Workforce Development (IWD), ACT, and Iowa Testing Programs. Each data source has its own dissemination schedule in the timing of data collection, analysis, and reporting, which does not always overlap with the timeline of this report. This variability limits the ability to report on all indicators at the same time annually.

Table 3. Indicators tracked for 2018-2019

Indicator	Data source	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016 /17	2017 /18	2018 /19
<b>STEM achievement and interest among preK-12 students</b>								
Iowa student achievement in mathematics and science	Iowa Testing Programs	✓	✓	✓	✓	✓	✓	✓
Iowa student achievement on NAEP mathematics and science tests <sup>1</sup>	National Center for Education Statistics	✓	✓	✓	✓	✓	✓	✓
Number/Percentage of preK-12 students interested in STEM topic areas	Iowa Testing Programs	✓	✓	✓	✓	✓	✓	✓
Number of students taking the ACT and average scores in mathematics/science	ACT	✓	✓	✓	✓	✓	✓	✓
Interest in STEM among ACT test-takers	ACT		✓	✓	✓	✓	✓	✓
Top 5 majors among ACT test-takers with interest in STEM	ACT		✓	✓	✓	✓	✓	✓
<b>STEM Preparation of preK-12 students</b>								
Enrollment in STEM courses in high school	Iowa Department of Education		✓	✓	✓	✓	✓	✓
Number of students taking STEM Advanced Placement tests and average scores	College Board	✓	✓	✓	✓	✓	✓	✓
Concurrent and dual enrollment in STEM courses	Iowa Department of Education					✓	✓	✓
Number of current Iowa teachers with K-8 STEM endorsements, 5-8 STEM endorsements, and K-12 STEM specialist endorsements <sup>2</sup>	Iowa Department of Education	✓	✓	✓	✓	✓	✓	✓
<b>Post-secondary enrollment and training in STEM fields</b>								
Community college enrollment and degrees/awards in STEM fields	Iowa Department of Education	✓	✓	✓	✓	✓	✓	✓
College and university enrollment and degrees awarded in STEM fields	Integrated Postsecondary Education Data System	✓	✓	✓	✓	✓	✓	✓
<b>STEM employment</b>								
Percent of Iowans in workforce employed in STEM occupations	Iowa Workforce Development	✓	✓	✓	✓	✓	✓	✓
Job vacancy rates in STEM occupational areas	Iowa Workforce Development	✓	✓	✓	✓	✓	✓	✓

1. NAEP science scores reported from FY13 through FY17.

2. For FY13 through FY16, indicator reported as number of current Iowa teachers with endorsement to teach STEM subjects.

## Indicator 1: Iowa student achievement in *mathematics* and *science*

Data source Iowa Testing Programs, The University of Iowa

This indicator tracks the proportion of Iowa students statewide who were proficient in *mathematics* and *science* from the first year of the Iowa Governor's STEM Advisory Council through the last year the Iowa Assessments were administered in 2017-2018. Data are reported in biennium periods. Biennium periods represent the average percentages of proficient students for the two school years represented, e.g., 2016-2018 represents the average of the 2016-2017 and 2017-2018 school years. This will be the last year that Iowa Assessments will be used for this indicator. Iowa's new standardized tests, the Iowa Statewide Assessment of Student Progress (ISASP), will be used beginning next year.

### Key findings

- In *mathematics* achievement, the average percentage of proficient students in the 2016-2018 biennium period was slightly higher than the 2011-2013 biennium period among 8<sup>th</sup> grade students, and was maintained among 11<sup>th</sup> grade students (Table 4). In the 2016-2018 biennium period, 75% of students in 8<sup>th</sup> grade and 82% of students in 11<sup>th</sup> grade were proficient in *mathematics*.
- From the 2011-2013 to the 2016-2018 biennium periods, the average proportions of students in 8<sup>th</sup> grade meeting *mathematics* proficiency increased slightly across several demographic groups, including students who are female, Hispanic, and/or with a disability; but decreased among students who are Black / African American (from 41% in 2011-2013 to 39% in 2016-2018).
- Among students who are Hispanic, the proportion meeting proficiency in *mathematics* decreased by three percent among those in 4<sup>th</sup> grade from 2011-2013 to 2016-2018, but increased by four percent for those in 8<sup>th</sup> grade and 11<sup>th</sup> grade.
- In *science* achievement, the average percentages of proficient students in the 2016-2018 biennium period are higher than the 2011-2013 biennium period among 8<sup>th</sup> grade students, but lower among 11<sup>th</sup> grade students. In the 2016-2018 biennium period, 83% of students in 8<sup>th</sup> grade and 78% of students in 11<sup>th</sup> grade were proficient in *science* (Table 5).
- Overall, there are disparities in proficiency. The proportions of minority students, those of low socioeconomic status, and students with disabilities that demonstrate proficiency are consistently lower than the overall rates. This is true in all biennium periods, all grade levels, and in both *mathematics* and *science*. Proficiency in *science* has declined the most among students in the 11<sup>th</sup> grade who are Black / African American, from 60% in 2011-2013 to 46% in 2016-2018.

Table 4. Proportion of Iowa students statewide who are proficient in *mathematics*

Grade		2011-2013	2016-2018	Trend since 2011-2013	Net difference since 2011-2013
4 <sup>th</sup>	Overall	78%	77%	↓	-1%
	Male	78%	79%	↑	1%
	Female	77%	75%	↓	-2%
	White	81%	82%	↑	1%
	Black / African American	48%	46%	↓	-2%
	Hispanic	65%	62%	↓	-3%
	Low income	66%	64%	↓	-2%
	Disability	45%	42%	↓	-3%
8 <sup>th</sup>	Overall	74%	75%	↑	1%
	Male	74%	74%	↔	0%
	Female	74%	76%	↑	2%
	White	78%	80%	↑	2%
	Black / African American	41%	39%	↓	-2%
	Hispanic	55%	59%	↑	4%
	Low income	58%	58%	↔	0%
	Disability	25%	26%	↑	1%
11 <sup>th</sup>	Overall	82%	82%	↔	0%
	Male	82%	81%	↓	-1%
	Female	82%	83%	↑	1%
	White	85%	86%	↑	1%
	Black / African American	53%	50%	↓	-3%
	Hispanic	65%	69%	↑	4%
	Low income	67%	67%	↔	0%
	Disability	42%	38%	↓	-4%

Source: Iowa Testing Programs, The University of Iowa

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2018.

<https://educateiowa.gov/sites/files/ed/documents/2018ConditionOfEducation.pdf>

1. Percentages for each biennium period represent average percentages of proficient students for the two school years represented, e.g., 2016-2018 represents the average of the 2016-2017 and 2017-2018 school years.

Table 5. Proportion of Iowa students statewide who are proficient in *science*

Grade		2011-2013	2016-2018	Trend since 2011-2013	Net difference since 2011-2013
8 <sup>th</sup>	Overall	76%	83%	↑	7%
	Male	77%	82%	↑	5%
	Female	74%	84%	↑	10%
	White	80%	87%	↑	7%
	Black / African American	43%	53%	↑	10%
	Hispanic	58%	71%	↑	13%
	Low income	62%	71%	↑	9%
	Disability	37%	47%	↑	10%
11 <sup>th</sup>	Overall	85%	78%	↓	-7%
	Male	84%	77%	↓	-7%
	Female	87%	80%	↓	-7%
	White	88%	83%	↓	-5%
	Black / African American	60%	46%	↓	-14%
	Hispanic	71%	63%	↓	-8%
	Low income	73%	63%	↓	-10%
	Disability	49%	35%	↓	-14%

Source: Iowa Testing Programs, The University of Iowa

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2018.

<https://educateiowa.gov/sites/files/ed/documents/2018ConditionOfEducation.pdf>

1. Percentages for each biennium period represent average percentages of proficient students for the two school years represented, e.g., 2016-2018 represents the average of the 2016-2017 and 2017-2018 school years.

## Indicator 2: Iowa student achievement on NAEP *mathematics* tests

**Data source** National Assessment of Educational Progress (NAEP), National Center for Education Statistics (NCES)

NAEP Assessments in *mathematics* are administered to 4<sup>th</sup> and 8<sup>th</sup> grade students in odd numbered years. NAEP Assessments in *science* were administered in 2009, 2011 (8<sup>th</sup> grade only), and 2015, and are reported in previous annual reports from FY13 through FY18.

### Key findings

- Compared to 2013, *mathematics* scores in 2019 decreased among 4<sup>th</sup> grade students and across all demographic subgroups. The difference was statistically significant for all students ( $p < .01$ ), males ( $p = .02$ ), females ( $p < .001$ ), and Hispanic students ( $p = .03$ ) (Table 6).
- Compared to 2013, *mathematics* scores in 2019 decreased among 8<sup>th</sup> grade students and across most demographic subgroups (overall, males, females, or Black / African American). The difference was statistically significant for all students ( $p = .02$ ) and males ( $p = .04$ ).
- The average scale scores among 8<sup>th</sup> grade students who are Hispanic increased four points from 265 in 2013 to 269 in 2019, though the difference was not statistically significant.
- Since 2013, Iowa's national rank dropped to 25<sup>th</sup> in the nation regarding 4<sup>th</sup> grade *mathematics* scores (compared to 14<sup>th</sup> in 2013). For 8<sup>th</sup> grade *mathematics*, Iowa's national rank of 26<sup>th</sup> dropped one spot from 2013.
- Less than half (42%) of 4<sup>th</sup> graders, and approximately one-third (33%) of 8<sup>th</sup> graders who took the NAEP mathematics test in 2019 scored well enough to be rated at or above proficient in *mathematics*.

Table 6. Iowa *Mathematics* scores on the National Assessment of Educational Progress

Grade	Variable	2013 <sup>1</sup>		2019		Iowa's Trend since 2013	
		Iowa	National	Iowa	National		
4 <sup>th</sup>	Scale score (0-500)	All students	246	242	241**	241	↓
		Males	247	242	243*	242	↓
	Females	244	241	239**	239	↓	
	Black / African American	218	224	215	224	↓	
	Hispanic	234	231	227*	231	↓	
	National rank <sup>2</sup>	14		25		↓	
	Num. jurisdictions significantly higher than IA <sup>3</sup>	4		10		↓	
	Percent at or above Proficient (>249)	48%		42%		↓	
	Percent at Advanced (>282)	9%		8%		↓	
8 <sup>th</sup>	Scale score (0-500)	All students	285	285	282*	282	↓
		Males	286	285	282*	282	↓
	Females	284	284	282	282	↓	
	Black / African American	255	263	249	260	↓	
	Hispanic	265	272	269	268	↑	
	National rank	25		26		↓	
	Num. jurisdictions significantly higher than IA <sup>3</sup>	17		19		↓	
	Percent at or above Proficient (>299)	36%		33%		↓	
	Percent at Advanced (>333)	7%		7%		↔	

\*Significant at p< .05, 2019 versus 2013, Iowa

\*\* Significant at p< .05, 2019 versus 2013, Iowa

Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), Mathematics Assessments

Retrieved from: <http://nces.ed.gov/nationsreportcard/statecomparisons/>  
<http://nces.ed.gov/nationsreportcard/naepdata/dataset.aspx>

1. NAEP Assessments in mathematics are administered to 4th and 8th grade students in odd numbered years; data for years not shown available upon request.
2. National rank is based out of 52 jurisdictions (50 states, the District of Columbia, and Department of Defense Education Activity).
3. A jurisdiction is defined as any government defined geographic area sampled in the NAEP assessment.

## Indicator 3: Number and percentage of students in Grades 3-5, Grades 6-8, and Grades 9-12 interested in STEM topics and careers

**Data source** Iowa Assessments (FY13-FY19) and Iowa Statewide Assessment of Student Progress (FY19), Iowa Testing Programs, The University of Iowa

Statewide standardized tests are taken annually by nearly every student in 3<sup>rd</sup> through 11<sup>th</sup> grade in the state of Iowa. The Iowa Assessments were administered from FY13 through FY18, and the Iowa Statewide Assessment of Student Progress were administered beginning in FY19. Since 2012-2013, an 8-item interest inventory has been added to the standardized tests. In January 2016, an additional item was added at the request of the Council (See Appendix A for items and frequencies). Schools have the option to administer the inventory to their students. The Interest Inventory was developed in part to serve as a data source for both the Iowa STEM Indicators, and as a way to compare students who participate in Scale-Up Programs with all students statewide (See Section 1 for results specific to STEM Scale-Up program participants).

For 2018-2019, among the 341,365 students in Iowa who took the Iowa Statewide Assessment of Student Progress, 260,334 also completed the Interest Inventory (76% participation rate).

### Key findings

- Among all students statewide, interest in individual STEM topics or in pursuing STEM careers started high in 2012-2013, and remained high through 2018-2019. Over 75% of all students statewide indicated they were *very interested* or *somewhat interested* in science, technology, engineering, or in pursuing a STEM career in 2018-2019 (Figure 13). Just less than seven in ten (69%) said they were *very interested* or *somewhat interested* in mathematics.
- In Figure 14, students who said they were *very interested* or *somewhat interested* were combined to compare changes in interest across the four STEM subjects and in STEM careers from 2012-2013 to 2018-2019 among all students statewide. Interest in the four STEM subjects is consistently highest among students in Grades 3-5, followed by students in Grades 6-8, and Grades 9-12, respectively. However, interest in pursuing a STEM career is comparable across the grade groups, ranging from 78% to 84%.
- More information and other results from the interest inventory can be found in Section 1.

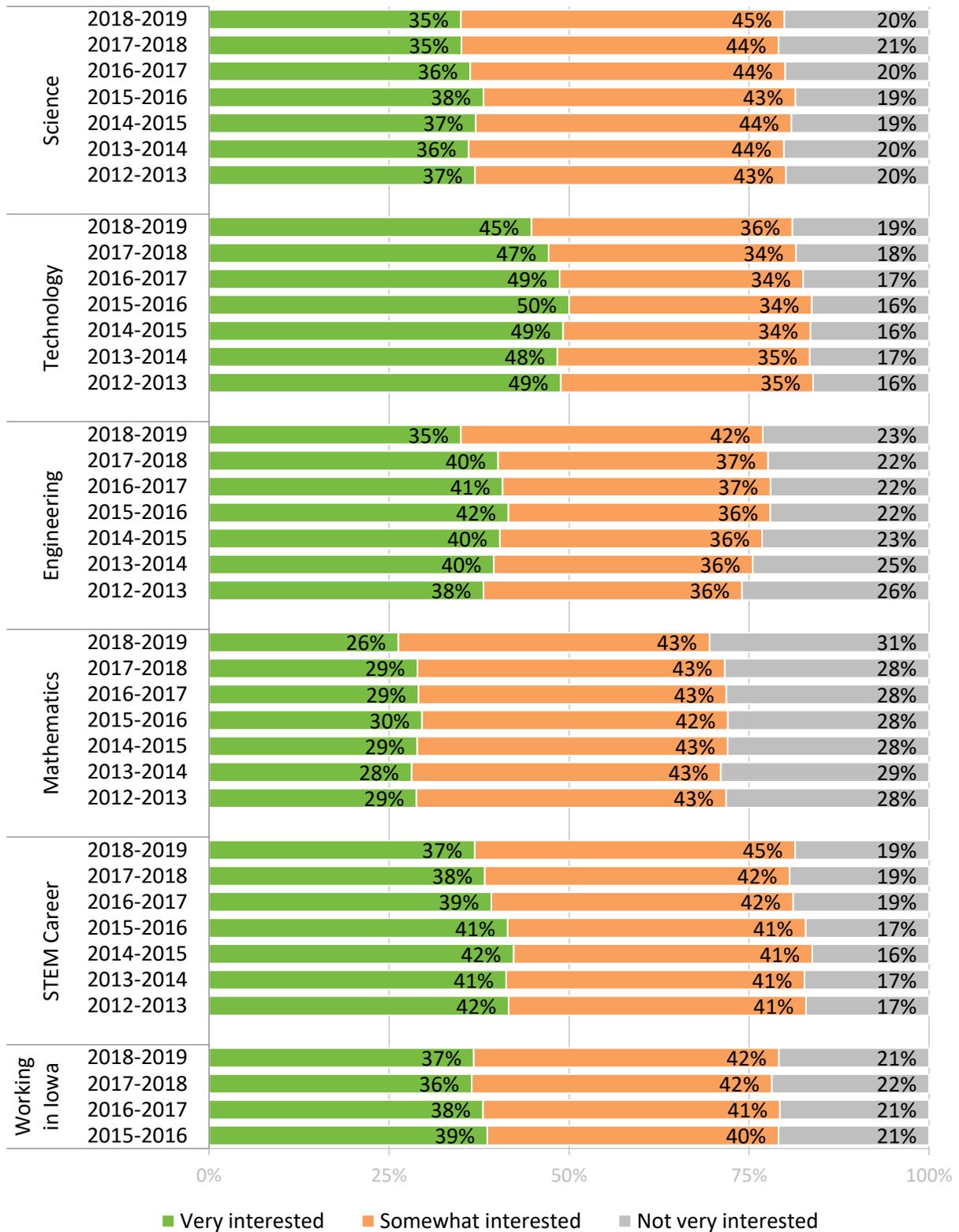


Figure 13. Statewide student interest in individual STEM topics, STEM careers, and working in Iowa 2012/13 to 2018/19

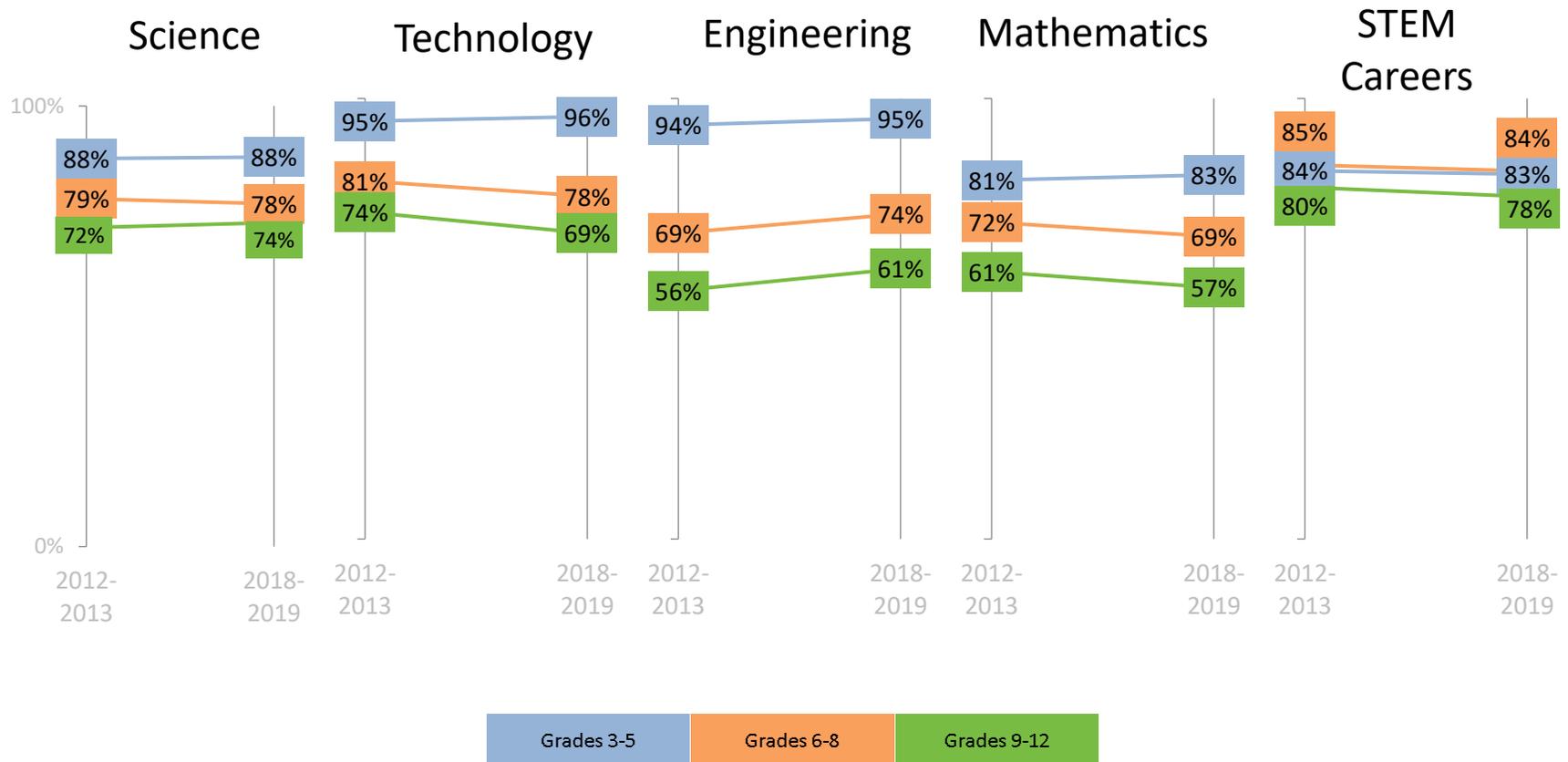


Figure 14. Proportion of all students statewide by grade group who said they were *very interested* or *somewhat interested* in STEM topics and STEM careers, 2012/13 to 2018/19

### Key findings (cont'd)

- Among all students statewide who took the Iowa Statewide Assessment of Student Progress in 2018-2019, interest in individual STEM subjects is highest among elementary students, followed by middle school and high school students, respectively (Figure 15).
- While interest in all subjects decreased from elementary grades through high school, the proportion of all students statewide who are *very interested* in pursuing a STEM career remains close across grade groups, from 38% among grades 3<sup>rd</sup> through 5<sup>th</sup>, 39% among grades 6<sup>th</sup> through 8<sup>th</sup>, and 33% among grades 9<sup>th</sup> through 12<sup>th</sup>.

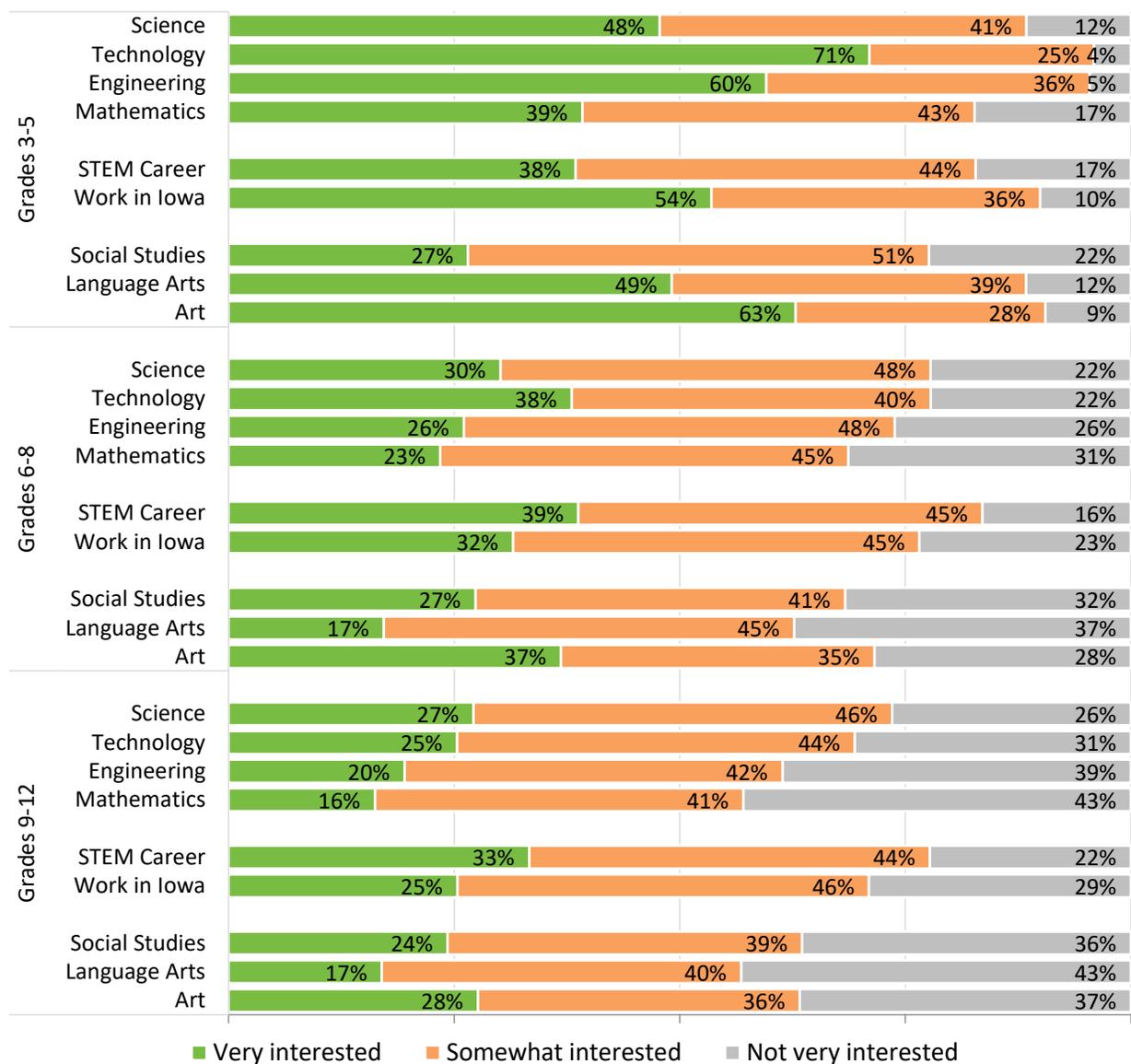


Figure 15. Statewide Student Interest Inventory for all students statewide by grade group, 2018/19 (n=260,334)

## Key findings (cont'd)

- Among all students statewide by gender, female interest in a STEM career has a steady rate of decline from an average of about 34% of females in Grades 3-5 who indicated they were *very interested* in STEM, to 30% of females in Grades 6-8, and 26% of females in Grades 9-11. Male interest remains fairly stable from 43% in Grades 3-5, 47% in Grades 6-8, and 40% in Grades 9-11. The pattern follows results from 2017-2018 (Figure 16).

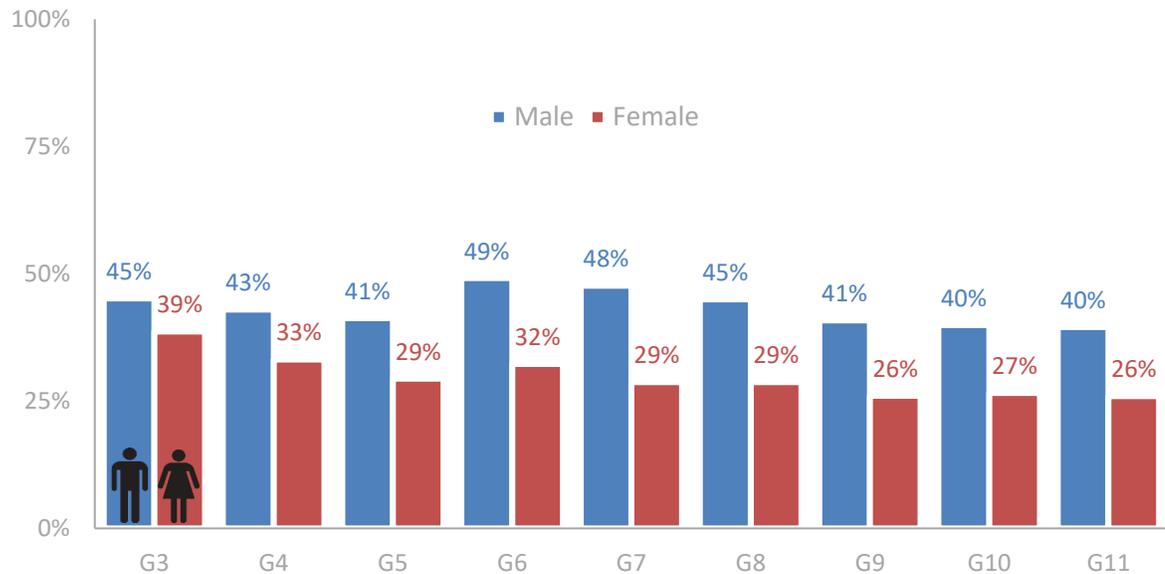


Figure 16. Percentage of male or female students statewide who said they were “Very Interested” in a STEM career by grade, 2018/19

- The proportion of both male and female students interested in individual STEM subject areas decline with advancing grade levels (Figure 17). There is very little difference between males and females in their interest in science and mathematics in any grade. However, the gender interest gap widens with advancing grades in the subject areas of computers and technology, and engineering
  - The proportion of students who are *very interested* in science is similar between males and females: 53% of males and 55% of females in grade 3 compared to an average of 28% of males and females in grade 11, respectively.
  - In mathematics, there is a similar trend of decline for both females and males with little difference between them in any grade: 47% of males and 40% of females are *very interested* in grade 3 compared to 17% of males and 13% of females in grade 11, respectively.
  - In computers and technology, the gap in grade 5 is -19 percentage points (78% of males versus 59% of females), in grade 8 is -31 percentage points (45% of males versus 14% of

females), and -26 percentage points in grade 11 (37% males versus 11% of females) between the proportions of males and females who are *very interested*.

- o In engineering, the gap in grade 5 is -5 percentage points (60% of males versus 55% of females), in grade 8 is -25 percentage points (36% of males versus 11% of females), and -23 percentage points in grade 11 (29% males versus 6% of females) between the proportions of males and females who are *very interested*.

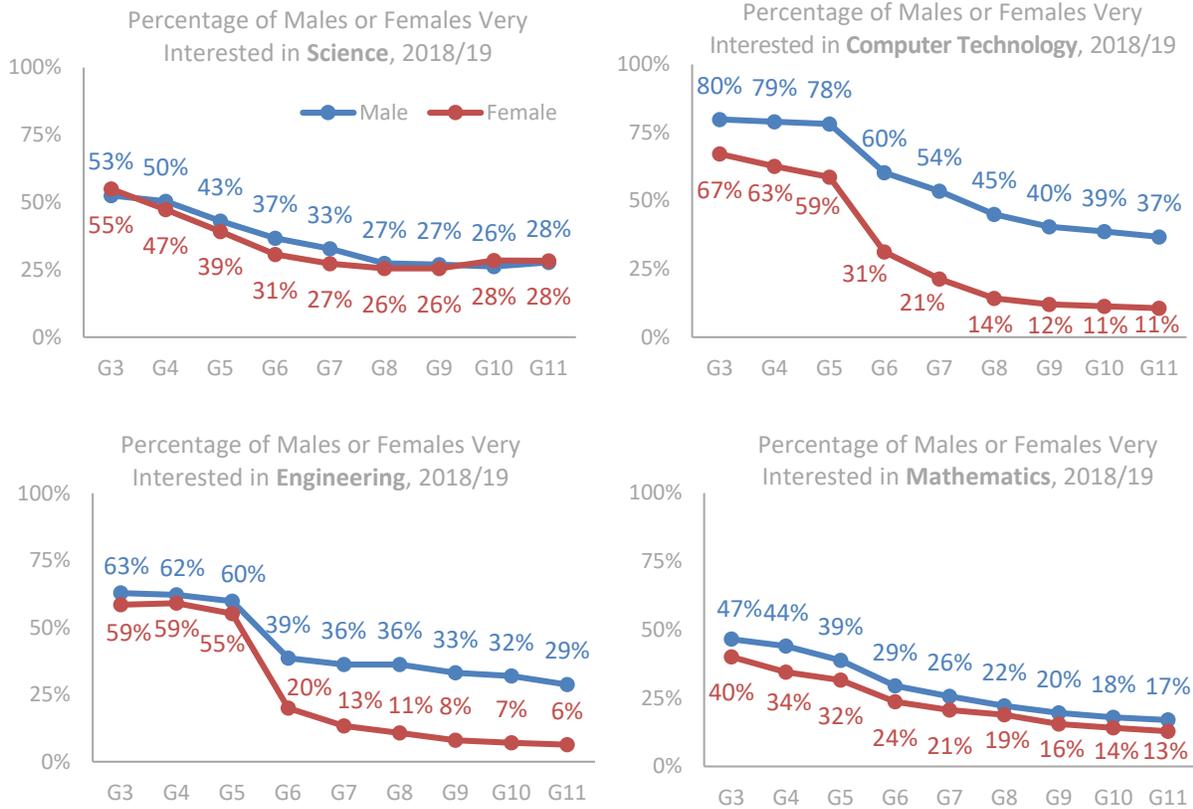


Figure 17. Percentage of males or females “very interested” in STEM-related subject areas by grade, 2018/19

- The proportion of students who are *very interested* in STEM careers is higher among students who are Black / African American, Hispanic, or Asian compared to White in grades 3 to 6 (Figure 18). Interest among students who are Asian remains high from grades 3 to 11, and declines only 7 percentage points for White students. In contrast, the proportion of Black / African American students who are *very interested* starts high at 50% in Grade 3 but declines to 34% in Grade 11 (a net loss of -16), and drops from 46% among Hispanic students in Grade 3 to 33% in Grade 11 (-13 net loss).

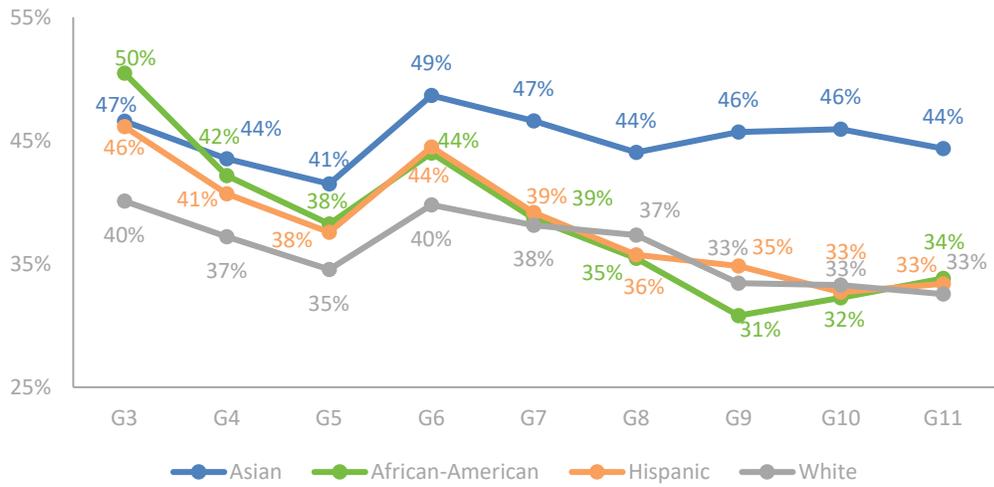


Figure 18. Percentage of all students statewide who said they were “very interested” in a STEM career by race/ethnicity, 2018/19

- A greater proportion of students who said they were *very interested* in a STEM career met Proficient or Advanced benchmarks in mathematics and science achievement on the Iowa Statewide Assessment of Student Progress (ISASP) compared to students who were *not very interested*. This is true for all students statewide regardless of gender (Figure 19) or race/ethnicity (data not shown).

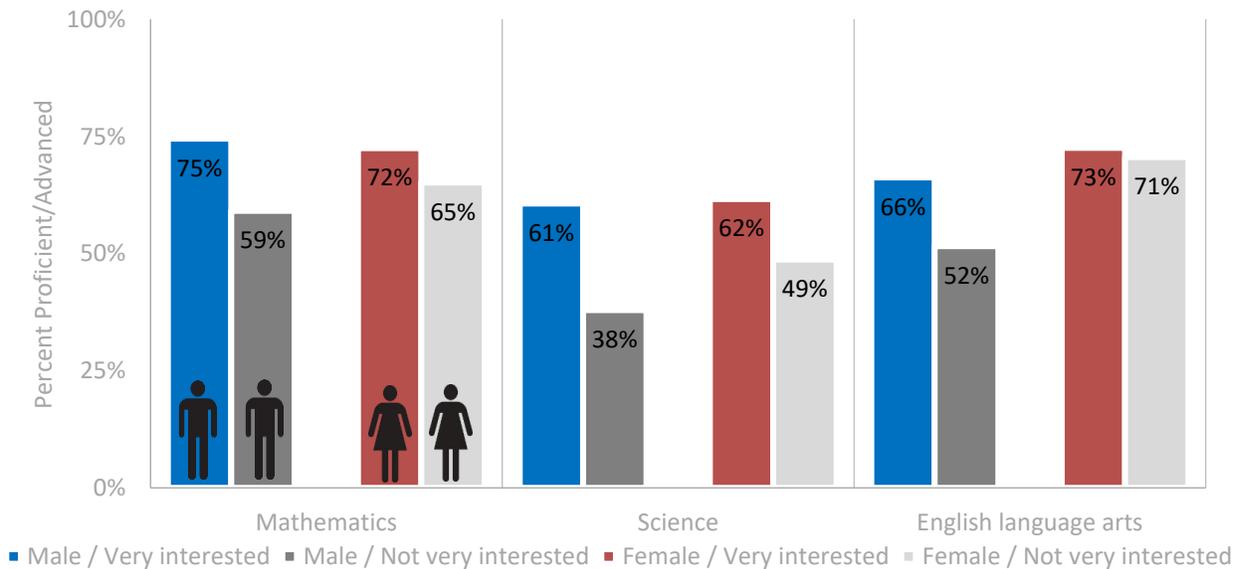


Figure 19. Percent of students Proficient or Advanced in Mathematics / Science / English language arts by level of interest in a STEM Career by gender, 2018/19

## Indicator 4: Number of students taking the ACT and average scores in *mathematics, science, and STEM*

Data source ACT, Inc.

*Mathematics* and *science* achievement on the ACT test is reported by year reflecting the performance of graduating seniors in that year who took the ACT test as a sophomore, junior, or senior and self-reported that they were scheduled to graduate in the respective year. Trends are compared from 2018 (which reflects graduating seniors in 2018 who took the ACT during 2015/16, 2016/17, or 2017/18 academic years, respectively) to 2013 (which reflects graduating seniors in 2013 who took the ACT in 2010/11, 2011/12, or 2012/13). Among Iowa's graduating class of 2018, 68% of students (n=24,028) took the ACT which has been consistent since 2013.

### Key findings

- Average ACT scores of graduating seniors in *mathematics* and *science* have changed very little from 2013 to 2018 (Table 7). In 2018, Iowa's average ACT score was 21.2 in *mathematics* and 22.0 in *science*, compared to 20.5 and 20.7 nationwide, respectively.
- Iowa's graduating class of 2018 who took the ACT achieved an average STEM score of 21.8 compared to 20.0 nationally, which reflects overall performance in mathematics and science. In 2018, about one in five (22%) graduating seniors in Iowa who took the ACT met STEM benchmarks.
- Disparities exist in average ACT scores by race/ethnicity with an average of 5 points lower among students who are Black / African American, and an average of 3 points lower among students who are Hispanic compared to their White counterparts (Table 8).
- In 2018, 44% of graduating seniors who took the ACT met benchmarks for *mathematics*, 45% met benchmarks for *science*, and 22% met benchmarks for *STEM*. Comparing the graduating class of 2018 to 2013, the proportion of Iowa ACT test-takers meeting benchmarks decreased by six percentage points for *mathematics*, and one percentage point for both *science* and *STEM* (Figure 20).
- By gender, the percent meeting college readiness benchmarks in *mathematics* decreased from 56% to 51% among males, and from 45% to 39% among females between 2013 and 2018, respectively. The proportion of males and females who met college readiness benchmarks in *science* also decreased between 2013 and 2018, from 52% to 50% among males, and 42% to 41% among females, respectively (Figure 20).
- Disparities exist among students by race/ethnicity with only 14% of Black / African American students and 24% of Hispanic students meeting benchmarks in *mathematics*, compared with 49% of White students in 2018 (Figure 21). However, the percent of students who were Hispanic who met *science* benchmarks increased from 2013 to 2018 (from 24% to 26%, respectively),

while the percent of students meeting *science* benchmarks who were Black / African American decreased from 15% to 14% in the same time period.

- A disparity also exists by race/ethnicity in the number of students who take the ACT. Of the over 24,000 students reflected in the 2018 data, approximately 1,700 (7%) were Hispanic and (3%) were Black / African American, respectively, compared to comprising 9% and 6% of the 15-19 year old statewide adolescent population (Table 8).

Table 7. ACT scores and benchmarks for Iowa students, 2013-2018

		Iowa 2013 <sup>1</sup>	Iowa 2018	Trend since 2013	National 2018
Overall	Number of students tested	22,526	24,028	↑	1,914,817
	Proportion of graduating class	66%	68%	↑	
	Average ACT scores <sup>2</sup>				
	Composite	22.1	21.8	↑	20.8
	Mathematics	21.6	21.2	↓	20.5
	Science	22.2	22.0	↓	20.7
	STEM	22.2	21.8	↓	20.0
	Percent meeting benchmarks <sup>3</sup>				
	Mathematics	50%	44%	↓	40%
	Science	46%	45%	↓	36%
STEM	23%	22%	↓	20%	
Males	Number of students tested	10,406	11,145	↑	893,610
	Average ACT scores				
	Composite	22.3	22.0	↓	20.8
	Mathematics	22.3	21.9	↓	20.9
	Science	22.8	22.5	↓	20.9
	STEM		22.5		21.2
	Percent meeting benchmarks				
Mathematics	56%	51%	↓	43%	
Science	52%	50%	↓	38%	
Females	Number of students tested	12,091	12,815	↑	991,975
	Average ACT scores				
	Composite	21.9	21.8	↓	20.9
	Mathematics	21.0	20.5	↓	20.2
	Science	21.7	21.6	↓	20.6
	STEM		21.3		20.7
	Percent meeting benchmarks				
Mathematics	45%	39%	↓	37%	
Science	42%	41%	↓	35%	

Source: ACT Profile Report: Graduating Class 2018, Iowa; ACT, Inc. [www.act.org/condition2018](http://www.act.org/condition2018)

1. Year reflects performance of graduating seniors in that year who took the ACT as a sophomore, junior, or senior and self-reported that they were scheduled to graduate in the corresponding year.
2. Scores: Include an overall Composite Score and individual test scores in four subject areas (English, Mathematics, Reading, Science) that range from 1 (low) to 36 (high). The Composite Score is the average of the four test scores, rounded to the nearest whole number. The STEM score describes student overall proficiency in mathematics and science.
3. College Readiness Benchmarks: the minimum score needed on an ACT subject-area test to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing college courses.

Table 8. ACT scores and benchmarks for Iowa students by student race/ethnicity, 2013-2018

		Iowa 2013 <sup>1</sup>	Iowa 2018	Trend since 2013	National 2018
White	Number of students tested	18,712	18,565	↓	996,712
	Average ACT scores <sup>2</sup>				
	Composite	22.5	22.4	↓	22.2
	Mathematics	21.9	21.7	↓	21.7
	Science	22.6	22.6	↔	22
	STEM		22.4		22.1
	Percent meeting benchmarks <sup>3</sup>				
	Mathematics	53%	49%	↓	49%
	Science	49%	50%	↑	46%
STEM		24%		26%	
African American	Number of students tested	601	734	↑	243,080
	Average ACT scores <sup>2</sup>				
	Composite	17.3	17.4	↑	16.9
	Mathematics	17.4	17.3	↓	16.9
	Science	17.8	17.8	↔	17.1
	STEM		17.8		17.3
	Percent meeting benchmarks <sup>3</sup>				
	Mathematics	16%	14%	↓	13%
	Science	15%	14%	↓	11%
STEM		4%		3%	
Hispanic	Number of students tested	1,204	1,684	↑	307,358
	Average ACT scores <sup>2</sup>				
	Composite	19.1	19.2	↑	18.8
	Mathematics	18.9	18.7	↓	18.8
	Science	19.4	19.7	↑	18.9
	STEM		19.4		19.1
	Percent meeting benchmarks <sup>3</sup>				
	Mathematics	27%	24%	↓	26%
	Science	24%	26%	↑	22%
STEM		9%		10%	

Source: ACT Profile Report: Graduating Class 2018, Iowa; ACT, Inc. [www.act.org/condition2018](http://www.act.org/condition2018)

1. Year reflects performance of graduating seniors in that year who took the ACT as a sophomore, junior, or senior and self-reported that they were scheduled to graduate in the corresponding year.
2. Scores: Include an overall Composite Score and individual test scores in four subject areas (English, Mathematics, Reading, Science) that range from 1 (low) to 36 (high). The Composite Score is the average of the four test scores, rounded to the nearest whole number. The STEM score describes student overall proficiency in mathematics and science.
3. College Readiness Benchmarks: the minimum score needed on an ACT subject-area test to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing college courses.

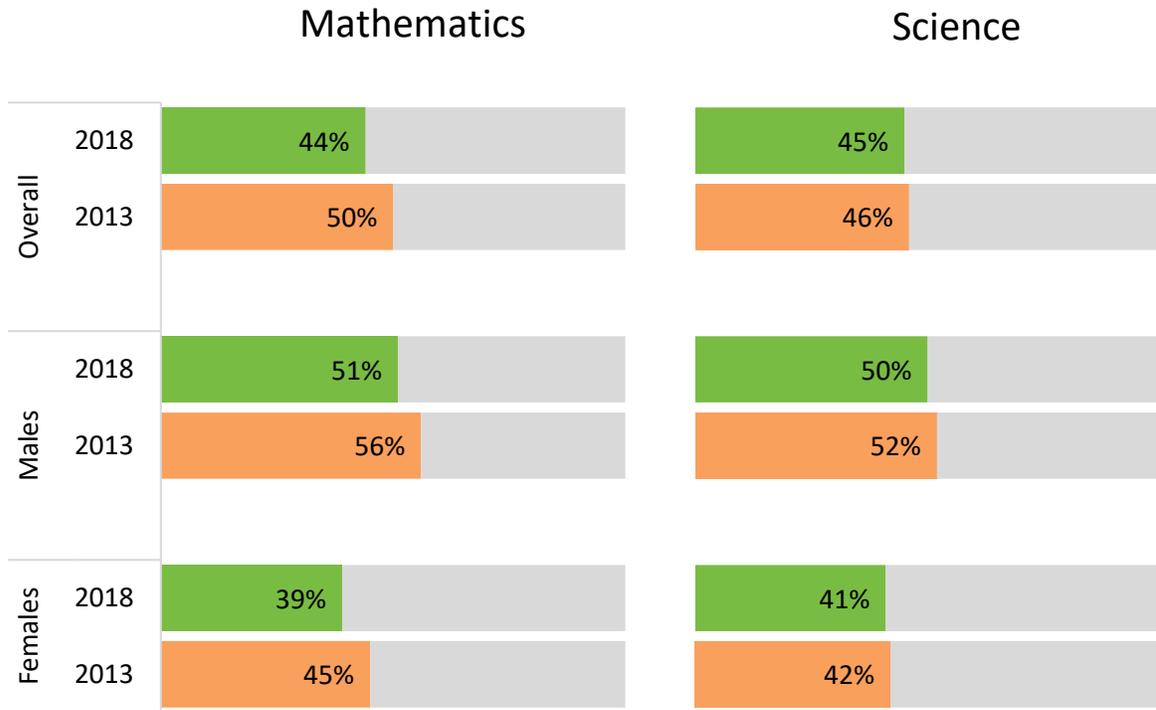


Figure 20. Percentage of Iowa graduating seniors meeting college readiness benchmarks in *mathematics* and *science* based on ACT scores by gender

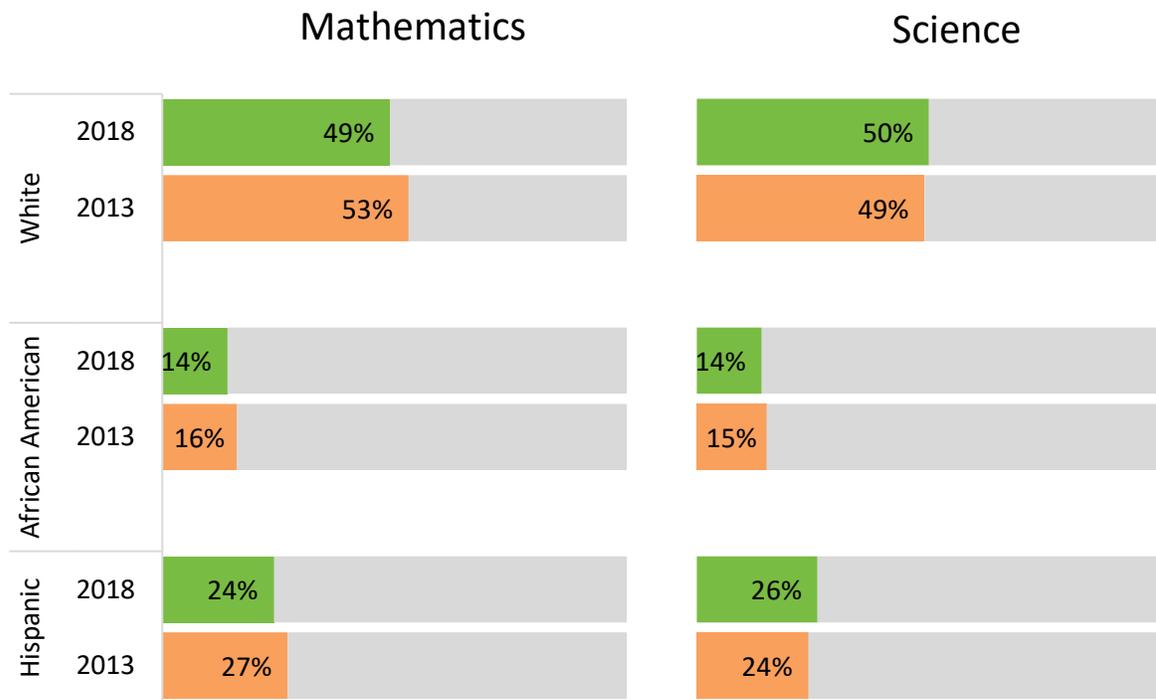


Figure 21. Percentage of Iowa graduating seniors meeting college readiness benchmarks in *mathematics* and *science* based on ACT scores by race/ethnicity

## Indicator 5: Interest in STEM among ACT test-takers

Data source ACT, Inc.

This indicator uses an aggregated sample of students who have an expressed and/or measured interest in STEM content. A student who has an expressed interest in STEM is choosing a major or occupation that corresponds with STEM fields. A measured interest utilizes the ACT Interest Inventory, an inventory administered with the ACT that determines interest in different occupations and majors.

The four STEM areas categorized by ACT include: *science*, *computer science/mathematics*, *medical and health*, and *engineering and technology*.

*Science* includes majors and occupations in the traditional hard sciences, as well as sciences involving the management of natural resources. This also includes science education.

*Computer science/mathematics* includes majors and occupations in the computer sciences, as well as general and applied mathematics. This also includes mathematics education.

*Engineering and technology* includes majors and occupations in engineering and engineering technologies.

*Medical and health* includes majors and occupations in the health sciences and medical technologies.

Results for this indicator do not include students who have expressed and/or measured interest in other subject areas. Note that the ACT is not taken by all students in Iowa, and mostly by those who are college-bound. In 2018, the proportion of Iowa's graduating class who had taken the ACT was 68% which has been consistent since 2013.

### Key findings

- Nearly half (49%) of students in the 2018 ACT-tested graduating class having an expressed and/or measured interest in pursuing STEM majors or occupations (Table 9).
- Compared to the 2013 ACT-tested graduating class, the proportion of students interested in STEM in 2018 has remained relatively stable by gender, with a plus-one percentage point increase in interest among females, and minus-one percentage point among males.
- By race/ethnicity, the proportion of the 2018 ACT-tested graduating class of students who are interested in STEM decreased from 43% to 40% among Black / African American students and 49% to 48% among Hispanic students from 2013-2018.

- Among all students who have an expressed and/or measured interest in STEM, 40% are in the area of *medical and health*, 25% in *science*, 23% in *technology/engineering*, and 12% in *computer science/mathematics* (Figure 22).
- Compared to males who have interest in STEM more evenly distributed across individual STEM topic areas and where the greatest percentage of 38% is in the area of *technology / engineering*, 56% of female interest is in the area of *medical and health*.
- The distribution of interest in STEM topic areas among students who are Black / African American or Hispanic mirrors the distribution across topic areas among all students combined.
  - For Black / African American students, 22% have an expressed and/or measured interest in *science*, 23% in *technology/engineering*, 10% in *computer science/mathematics*, and 45% in *medical and health*.
  - For Hispanic students, 24% have an expressed and/or measured interest in *science*, 22% in *technology/engineering*, 9% in *computer science/mathematics*, and 44% in *medical and health*.

Table 9. Percentage of Iowa high school students who have taken the ACT with an expressed and/or measured interest in STEM-related topics, 2013 to 2018

STEM Interest	2013	2014	2015	2016	2017	2018	Trend since 2013
<b>All STEM</b>							
All Students	49%	49%	48%	49%	48%	49%	↔
Male	52%	54%	54%	55%	51%	51%	↓
Female	46%	46%	46%	48%	46%	47%	↑
White	49%	50%	50%	51%	49%	51%	↑
Black / African American	43%	42%	41%	43%	37%	40%	↓
Hispanic	49%	48%	47%	49%	41%	48%	↓
<b>Science</b>							
All Students	25%	24%	25%	25%	25%	25%	↔
Male	22%	23%	22%	22%	22%	22%	↔
Female	27%	26%	28%	28%	28%	29%	↑
White	25%	25%	25%	25%	26%	26%	↑
Black / African American	15%	17%	15%	26%	20%	22%	↑
Hispanic	22%	24%	20%	22%	25%	24%	↑
<b>Technology and Engineering</b>							
All Students	22%	22%	22%	23%	22%	23%	↑
Male	39%	37%	37%	38%	37%	38%	↓
Female	6%	7%	7%	8%	8%	8%	↑
White	22%	23%	23%	23%	22%	22%	↔
Black / African American	22%	21%	24%	20%	20%	23%	↑
Hispanic	23%	20%	22%	22%	21%	22%	↓
<b>Computer Science / Mathematics</b>							
All Students	10%	10%	10%	11%	11%	12%	↑
Male	14%	14%	15%	15%	17%	17%	↑
Female	5%	5%	6%	6%	6%	7%	↑
White	10%	10%	10%	11%	11%	12%	↑
Black / African American	11%	10%	13%	9%	14%	10%	↓
Hispanic	9%	8%	11%	11%	12%	9%	↔
<b>Medical and Health</b>							
All Students	43%	44%	42%	41%	42%	40%	↓
Male	25%	26%	25%	25%	24%	24%	↓
Female	61%	61%	59%	58%	58%	56%	↓
White	43%	43%	42%	41%	42%	40%	↓
Black / African American	52%	53%	48%	44%	45%	45%	↓
Hispanic	47%	47%	46%	46%	42%	44%	↓

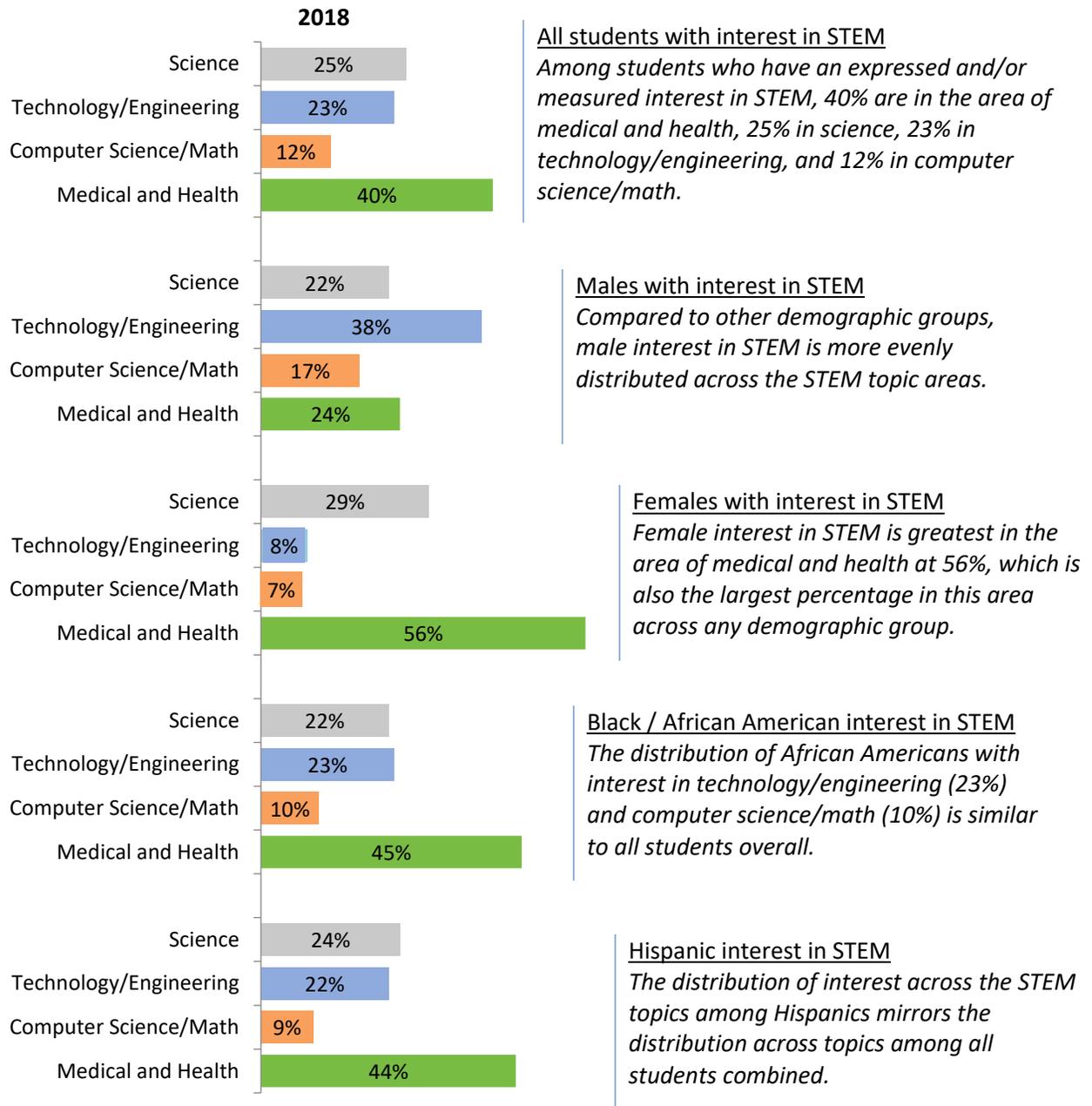


Figure 22. Percentage of Iowa high school students who took the ACT in 2018 who have expressed and/or measured interest in STEM-related topics

## Indicator 6: Top 5 majors among ACT test-takers with interest in STEM

Data source ACT, Inc.

This indicator uses an aggregated sample of students who have an expressed and/or measured interest in STEM only. A student who has an expressed interest in STEM is choosing a major or occupation that corresponds with STEM fields. A measured interest utilizes the ACT interest inventory that determines inherent interest in different occupations and majors. Results do not include students who have expressed and/or measured interest in alternative subject areas. Note that the ACT is not taken by all students in Iowa, and mostly by those who are college-bound. Among Iowa's graduating class of 2018, 68% of students (n=24,028) took the ACT.

### Key findings

- Among those that aspire to a two-year degree (Table 10), 2018 STEM career interests remain strongly gendered with the top five two-year college majors for females in health-related fields (nursing and radiologic technology), animal sciences and veterinary medicine (pre-vet), and zoology. While for males the top five majors were electrical/ electronic engineering, animal sciences, computer engineering technology, computer science and programming, and agronomy and crop science.
- Among those that aspire to a four-year degree or more (Table 11), the top five majors indicated by the 2018 ACT-tested graduating class with an expressed and/or measured interest in STEM were three related to health and medical fields (nursing, pre-medicine, or pre-physical therapy, or athletic training), computer science and programming, and science (biology).

Table 10. Top 5 majors among ACT-tested graduating class in 2013 and 2018 who have expressed and/or measured interest in STEM and aspire to a two-year degree

	2013	2018
All Students	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Medical Radiologic Technology</li> <li>3. Animal Sciences</li> <li>4. Nursing, Practical/Vocational (LPN)</li> <li>5. Health/Medical Technology, General</li> </ol>	<ol style="list-style-type: none"> <li>1. Medical Radiologic Technology</li> <li>2. Nursing, Registered (BS/RN)</li> <li>3. Animal Sciences</li> <li>4. Electrical, Electronic, &amp; Comm Engr</li> <li>5. Computer Science &amp; Programming</li> </ol>
Males	<ol style="list-style-type: none"> <li>1. Computer Network/Telecommunications</li> <li>2. Mechanical Engineering</li> <li>3. Computer Software &amp; Media Application</li> <li>4. Animal Sciences</li> <li>5. Automotive Engineering Technology</li> </ol>	<ol style="list-style-type: none"> <li>1. Electrical, Electronic, &amp; Comm Engr</li> <li>2. Animal Sciences</li> <li>3. Computer Engineering Technology</li> <li>4. Computer Science &amp; Programming</li> <li>5. Agronomy &amp; Crop Science</li> </ol>
Females	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Medical Radiologic Technology</li> <li>3. Nursing, Practical/Vocational (LPN)</li> <li>4. Health/Medical Technology, General</li> <li>5. Animal Sciences</li> </ol>	<ol style="list-style-type: none"> <li>1. Medical Radiologic Technology</li> <li>2. Nursing, Registered (BS/RN)</li> <li>3. Animal Sciences</li> <li>4. Veterinary Medicine (Pre-Vet)</li> <li>5. Zoology</li> </ol>
White	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Medical Radiologic Technology</li> <li>3. Animal Sciences</li> <li>4. Physical Therapy (Pre-Physical Therapy)</li> <li>5. Health/Medical Technology, General</li> </ol>	<ol style="list-style-type: none"> <li>1. Medical Radiologic Technology</li> <li>2. Animal Sciences</li> <li>3. Nursing, Registered (BS/RN)</li> <li>4. Computer Science &amp; Programming</li> <li>5. Electrical, Electronic, &amp; Comm Engr</li> </ol>
Black / African American	<ol style="list-style-type: none"> <li>1. Nursing, Practical/Vocational (LPN)</li> <li>2. Veterinary Medicine (Pre-Vet)</li> <li>3. Athletic Training</li> <li>4. Computer Network/Telecommunications</li> <li>5. Computer Science &amp; Programming</li> </ol>	<ol style="list-style-type: none"> <li>1. Athletic Training</li> <li>2. Computer Engineering Technology</li> <li>3. Construction Engineering/Management</li> <li>4. Engineering Technology, General</li> <li>5. Genetics</li> </ol>
Hispanic/Latino	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Automotive Engineering Technology</li> <li>3. Engineering Technology, General</li> <li>4. Medical Radiologic Technology</li> <li>5. Civil Engineering</li> </ol>	<ol style="list-style-type: none"> <li>1. Nursing, Registered (BS/RN)</li> <li>2. Medical Radiologic Technology</li> <li>3. Electrical, Electronic, &amp; Comm Engr</li> <li>4. Nursing, Practical/Vocational (LPN)</li> <li>5. Veterinarian Assisting/Technology</li> </ol>

Table 11. Top 5 majors among ACT-tested graduating class in 2013 and 2018 who have expressed and/or measured interest in STEM and aspire to a four-year degree or more

	2013	2018
All Students	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Physical Therapy (Pre-Physical Therapy)</li> <li>4. Athletic Training</li> <li>5. Mechanical Engineering</li> </ol>	<ol style="list-style-type: none"> <li>1. Nursing, Registered (BS/RN)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Biology, General</li> <li>4. Computer Science &amp; Programming</li> <li>5. Physical Therapy (Pre-Physical Therapy)</li> </ol>
Males	<ol style="list-style-type: none"> <li>1. Mechanical Engineering</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Athletic Training</li> <li>4. Engineering (Pre-Engineering), Gen</li> <li>5. Computer Science &amp; Programming</li> </ol>	<ol style="list-style-type: none"> <li>1. Computer Science &amp; Programming</li> <li>2. Mechanical Engineering</li> <li>3. Medicine (Pre-Medicine)</li> <li>4. Athletic Training</li> <li>5. Engineering (Pre-Engineering), Gen</li> </ol>
Females	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Physical Therapy (Pre-Physical Therapy)</li> <li>4. Biology, General</li> <li>5. Animal Sciences</li> </ol>	<ol style="list-style-type: none"> <li>1. Nursing, Registered (BS/RN)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Biology, General</li> <li>4. Physical Therapy (Pre-Physical Therapy)</li> <li>5. Animal Sciences</li> </ol>
White	<ol style="list-style-type: none"> <li>1. Nursing, Registered (B.S./R.N.)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Physical Therapy (Pre-Physical Therapy)</li> <li>4. Athletic Training</li> <li>5. Mechanical Engineering</li> </ol>	<ol style="list-style-type: none"> <li>1. Nursing, Registered (BS/RN)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Biology, General</li> <li>4. Physical Therapy (Pre-Physical Therapy)</li> <li>5. Computer Science &amp; Programming</li> </ol>
Black / African American	<ol style="list-style-type: none"> <li>1. Medicine (Pre-Medicine)</li> <li>2. Nursing, Registered (B.S./R.N.)</li> <li>3. Athletic Training</li> <li>4. Mechanical Engineering</li> <li>5. Nursing, Practical/Vocational (LPN)</li> </ol>	<ol style="list-style-type: none"> <li>1. Nursing, Registered (BS/RN)</li> <li>2. Medicine (Pre-Medicine)</li> <li>3. Biology, General</li> <li>4. Athletic Training</li> <li>5. Mechanical Engineering</li> </ol>
Hispanic/ Latino	<ol style="list-style-type: none"> <li>1. Medicine (Pre-Medicine)</li> <li>2. Nursing, Registered (B.S./R.N.)</li> <li>3. Physical Therapy (Pre-Physical Therapy)</li> <li>4. Mechanical Engineering</li> <li>5. Architecture, General</li> </ol>	<ol style="list-style-type: none"> <li>1. Medicine (Pre-Medicine)</li> <li>2. Nursing, Registered (BS/RN)</li> <li>3. Biology, General</li> <li>4. Biochemistry &amp; Biophysics</li> <li>5. Mechanical Engineering</li> </ol>

## Indicator 7: Enrollment in STEM-related courses in high school

Data source Iowa Department of Education, Bureau of Information and Analysis Services, 2019

Indicator 7 investigates the opportunities available for Iowa students to take basic and advanced level STEM courses in high school.

### Key findings

Table 12 provides the number of high school students statewide enrolled in each STEM-related subject area over a seven-year period. Note that core mathematics and science enrollment increases and decreases, in contrast to elective course enrollment trends, likely reflect population shifts.

- Compared to last year, student enrollment in STEM courses has increased in some subject areas and decreased in others. From 2017-2018 to 2018-2019, *science* courses showed a 2% increase. Enrollment in *mathematics* courses also increased, but did so by less than 1%. Conversely, enrollment in *engineering* courses fell by 7% and enrollment in *technology* dropped by 7%. The largest decline in enrollment was in *health* courses, which dropped by 31% compared to last year.
- In addition, the trend in student enrollment in STEM-related courses since the Governor's STEM Advisory Council was established in 2011-2012 was compared to the two years prior to the establishment of the Council.
  - From 2009-2010 to 2010-2011, the number of high school students enrolled in *science* courses increased by less than 1%. Between 2011-2012 and 2018-2019, enrollment increased by 7%.
  - The number of students enrolled in *technology* courses has continued to decrease over time, by 12% from 2009-2010 to 2010-2011 and then another 20% decrease from 2011-2012 to 2018-2019.
  - From 2009-2010 to 2010-2011, the number of students enrolled in high school *engineering* courses increased by 20%. Enrollment in engineering-related courses increased every year thereafter until 2015-2016, when it declined for the first time. Enrollment has decreased both years since then, dropping 48% this year compared to last year.
  - From 2009-2010 to 2010-2011, the number of Iowa high school students enrolled in *mathematics* courses decreased by 1%. Conversely, between 2011-2012 and 2018-2019, the number of high school students enrolled in *mathematics* classes increased by 17%.
  - The number of Iowa high school students enrolled in *health* courses decreased by 4% from 2009-2010 to 2010-2011. Since 2011-2012, enrollment in *health* courses has decreased by 20%.

Table 12. Student enrollment in high school courses of STEM-related subject areas

	2009/10	2010/11	% Change 2009/10- 2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	% Change 2011/12- 2018/19
Science	72,428	72,114	<-1%	73,150	73,633	73,996	74,178	75,997	75,195	76,869	78,112	+7%
Male	49.4%	49.8%		49.5%	49.6%	49.7%	49.4%	49.2%	49.1%	48.6%	48.4%	
Female	50.6%	50.2%		50.5%	50.4%	50.3%	50.6%	50.8%	50.9%	51.4%	51.6%	
Technology	8,644	7,647	-12%	7,818	7,791	7,032	7,239	7,086	6,889	6,755	6,293	-20%
Male	65.5%	64.2%		66.9%	69.2%	71.1%	73.9%	72.8%	73.2%	74.9%	74.5%	
Female	34.5%	35.8%		33.1%	30.8%	28.9%	26.1%	27.2%	26.8%	25.1%	25.5%	
Engineering	5,327	6,386	+20%	7,303	7,954	8,952	8,957	7,882	7,082	4,070	3,777	-48%
Male	84.9%	83.7%		84.1%	83.6%	83.5%	84.5%	83.6%	84.4%	87.1%	85.5%	
Female	15.1%	16.3%		15.9%	16.4%	16.5%	15.5%	16.4%	15.6%	12.9%	14.5%	
Mathematics	47,481	46,934	-1%	47,563	49,602	51,210	50,894	54,163	55,710	55,357	55,451	+17%
Male	49.3%	49.1%		49.3%	49.5%	49.5%	49.4%	49.1%	48.9%	49.1%	49.1%	
Female	50.7%	50.9%		50.7%	50.5%	50.5%	50.6%	50.9%	51.1%	50.9%	50.9%	
Health	289	278	-4%	343	412	373	296	364	397	398	274	-20%
Male	31.1%	25.2%		26.2%	31.3%	31.6%	24.7%	21.4%	24.7%	20.4%	29.2%	
Female	68.9%	74.8%		73.8%	68.7%	68.4%	75.3%	78.6%	75.3%	79.7%	70.8%	

Source: Iowa Department of Education, Bureau of Information and Analysis Services, 2019

Key findings (cont'd)

- The percentage of underrepresented minority students enrolled in STEM-subject areas has typically increased annually in the last six years (Table 13). Enrollment by underrepresented minority students in *science* has increased by 4.6%, 1.2% in *technology*, 3.2% in *engineering*, 5.2% in *mathematics*, and 3.3% in *health*.

Table 13. Percentage of students enrolled in STEM subject courses who are an underrepresented minority<sup>1</sup>

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Science	15.6%	16.5%	17.2%	18.4%	18.9%	20.2%
Technology	13.2%	14.1%	14.3%	14.9%	16.4%	14.4%
Engineering	14.3%	15.2%	13.5%	14.0%	17.3%	17.5%
Mathematics	9.5%	9.9%	12.0%	13.4%	14.0%	14.7%
Health	5.1%	5.4%	4.7%	11.1%	10.3%	8.4%

1. Underrepresented minority students include Black or African American, Hispanic/Latino, American Indian or Alaska Native, and Native Hawaiian or other Pacific Islander, including:  
 Hispanic/Latino (A person of Cuban, Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.)  
 American Indian or Alaska Native (A person having origins in any of the original peoples of North and South America, including Central America, and who maintains tribal affiliation or community attachment.)  
 Black or African American (A person having origins in any of the Black racial groups of Africa.)  
 Native Hawaiian or Other Pacific Islander (A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.)

## Indicator 8: Number of students taking STEM-related Advanced Placement tests and average scores

Data source College Board

### Key findings

- From 2013 to 2018, the number of students taking Advanced Placement courses in STEM-related subjects increased from 5,355 to 6,527, as well as the number of students who qualified to receive college credit from these courses (from 3,461 in 2013 to 4,155 in 2018).

	2013	2014	2015	2016	2017	2018	% change since 2013
Number receiving STEM-related college credit	3,461	3,753	3,976	4,191	4,217	4,155	20%
Number taking AP STEM-related courses	5,355	5,600	6,067	6,537	6,552	6,527	22%

- Comparing 2013 to 2018, the proportion of students scoring 3 or better on the AP exam increased in Calculus BC, Environmental Science, Physics 1, Physics 2, and Physics C: Mechanics. However, the proportion decreased in Biology, Chemistry, Computer Science A, Computer Science Principles, Physics C: Electricity & Magnetism, and Statistics (Table 14).

Table 14. Percentage of Iowa high school students scoring 3 or higher on Advanced Placement exams in STEM-related topics

	2013	2014	2015	2016	2017	2108	Trend
	% (n) <sup>1,2</sup>	% (n)	since 2013				
Biology	70% (735)	75% (877)	76% (866)	71% (745)	74% (790)	66% (693)	↓
Calculus AB	59% (821)	61% (872)	61% (863)	61% (887)	61% (883)	59% (820)	↔
Calculus BC	77% (290)	85% (311)	77% (298)	77% (396)	84% (385)	79% (400)	↑
Chemistry	58% (462)	55% (461)	55% (487)	53% (533)	52% (514)	54% (522)	↓
Computer Science A	80% (94)	83% (99)	87% (147)	77% (163)	78% (182)	78% (179)	↓
Computer Science Principles					79% (85)	75% (129)	↓
Environmental Science	56% (227)	54% (217)	52% (215)	52% (275)	50% (206)	58% (240)	↑
Physics B	71% (277)	69% (278)					
Physics 1			53% (301)	51% (283)	54% (302)	55% (289)	↑
Physics 2			58% (26)	87% (59)	80% (61)	85% (52)	↑
Physics C: Elec. & Magnet.	61% (27)	82% (31)	72% (32)	76% (22)	59% (26)	59% (27)	↓
Physics C: Mechanics	67% (79)	77% (89)	85% (148)	81% (110)	90% (147)	80% (140)	↑
Statistics	69% (449)	71% (518)	72% (569)	73% (718)	64% (636)	67% (664)	↓

Source: AP Program Participation and Performance Data, 2012-2018, College Board

Retrieved from: <http://research.collegeboard.org/programs/ap/data>

1. College-level Advanced Placement (AP) courses are available to Iowa high school students through College Board in 22 subject areas. Optional tests are included with the AP courses. Scores can range from 1 to 5, with 3 or better indicating that the student is qualified to receive college credit in that topic. Percentages reflect the proportion of test takers within each subject who scored 3 or higher.
2. Number in parentheses indicates the numerator in the proportion.

## Indicator 9: Iowa concurrent enrollment in science and mathematics

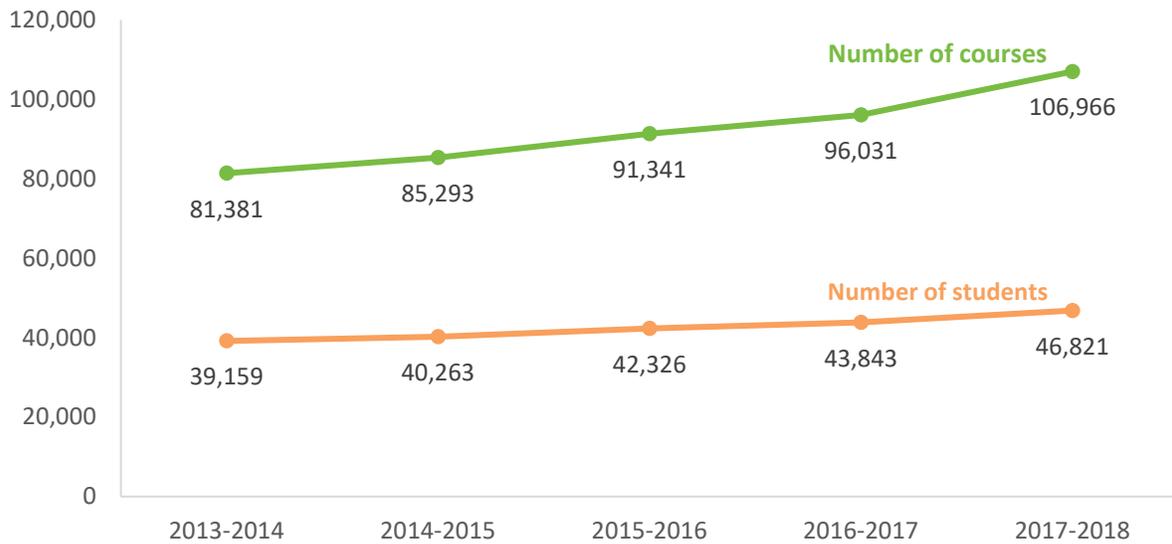
**Data sources** Annual Condition of Education Report 2018, Iowa Department of Education, January 2018, Joint Enrollment FY2018 Annual Report, Iowa Department of Education, and Metrics That Matter, Future Ready Iowa Alliance

This indicator tracks the concurrent enrollment and number of courses taken. The data are reported annually and compiled by the Iowa Department of Education for reporting of the Annual Condition of Education. Additional sources provide information about joint enrollment.

Concurrent enrollment courses are offered by community colleges through 28E agreements between school districts and community colleges. The two courses are designed slightly different: 1) the courses are designed for both college and high school students for concurrent credit offered by community colleges; 2) the courses are designed for high school students offered by community colleges to bridge high school students to community college programs and typically provide coursework in science, technology, engineering, and mathematics (STEM) or other highly technical areas. The second type of course through 28E agreements between high school and community college are designed for career academy concurrent credit.

### Key findings

- In FY2018, a total of 50,001 unduplicated high school students jointly enrolled in community college courses, an increase of 2.3% from FY2017.
- Thirty-one percent (31%) of all Iowa public high school students (grades nine through 12) jointly enrolled in community college courses in FY 2018, averaging 8.3 credit hours per student.
- Ninety-seven percent (97%) of joint enrollment is through concurrent enrollment, 3% through paid tuition, and <1% through the Post-Secondary Enrollment Option (PSEO).
- Figure 23 shows the past five years of concurrent enrollment courses taken by Iowa public high school students and concurrent enrollment from 2013-2014 to 2017-2018. Concurrent enrollment increased by 20%, and the number of courses taken increased by 31% in that time.
- Ninety-nine percent of Iowa districts (only those districts that had a public high school) had concurrent enrollments in 2018-2019. In general, an upward trend of districts with concurrent enrollment is reported in Table 15.
- Concurrent enrollments by grade are displayed in Table 16. Of all concurrently enrolled students, the proportion who are high school seniors has steadily decreased from 47% in 2013-2014 to 45% in 2017-2018.
- Table 17 and Figure 23 show the concurrent enrollment courses taken in STEM-related subject areas for the past three years. The highest percentages of courses taken were in career technical/ vocational education.
- The number of concurrent enrollment courses taken by high school students has increased each year, with 9,678 mathematics courses and 4,483 science courses taken in 2017-2018.



Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Figure 23. Iowa concurrent enrollment and courses taken 2013/14 to 2017/18

Table 15. Iowa Districts with Concurrent Enrollment 2013/14 to 2017/18

Year	Total # of Districts	Districts with High Schools	Districts with Concurrent Enrollment	Percent of Districts with High Schools that had Concurrent Enrollment
2013-2014	346	314	310	98.7%
2014-2015	338	312	302	96.8%
2015-2016	336	310	304	98.1%
2016-2017	333	306	302	98.7%
2017-2018	333	304	302	99.3%

Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2018.

<https://educateiowa.gov/sites/files/ed/documents/2018ConditionOfEducation.pdf>

Table 16. Total number of Iowa school students taking concurrent enrollment courses 2013/14 to 2017/18

Year	9th Graders	10th Graders	11th Graders	12th Graders	Total Enrollment
2013-2014	2,748	5,056	12,858	18,497	39,159
2014-2015	3,013	5,421	13,204	18,625	40,263
2015-2016	3,414	6,039	13,668	19,205	42,326
2016-2017	3,279	6,017	14,871	19,676	43,843
2017-2018	3,512	6,691	15,555	21,063	46,821

Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2018.

<https://educateiowa.gov/sites/files/ed/documents/2018ConditionOfEducation.pdf>

Table 17. Iowa concurrent enrollment courses taken by STEM-related subject area 2013/14 to 2017/18

Subject Area	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Mathematics	8,200 (10%)	8,311 (10%)	8,570 (9%)	8,909 (9%)	9,678 (9%)
Science	3,163 (4%)	3,031 (4%)	3,624 (4%)	3,829 (4%)	4,483 (4%)
Career technical / Vocational education	28,904 (36%)	29,801 (35%)	31,553 (35%)	36,617 (38%)	35,169 (33%)
Total courses taken	81,381	85,293	91,341	96,031	106,966

Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2018.

<https://educateiowa.gov/sites/files/ed/documents/2018ConditionOfEducation.pdf>

## Indicator 10: Number of current Iowa teachers with endorsements in K-8 STEM, 5-8 STEM, K-12 STEM specialist, 5-12 engineering, and/or 5-12 CTE Information Technology

**Data source** Basic Educational Data Survey (BEDS), Bureau of Information and Analysis Services, Iowa Department of Education

A collaborative effort of the Governor’s STEM Advisory Council and the Board of Educational Examiners (BOEE) led to the development of a STEM endorsement available to teachers and teacher candidates. Three endorsements—K-8 STEM, 5-8 STEM, and K-12 STEM Specialist—authorize educators to teach science, mathematics, and integrated STEM courses in grades Kindergarten through eighth grade, fifth through eighth grade, or Kindergarten through twelfth grade, respectively.<sup>1</sup> Endorsement in 5-12 engineering is also reported.

The BOEE also created a new 5-12 Career and Technical Information Technology (CTE-IT) endorsement to recognize specified technology courses as part of a comprehensive CTE program. This endorsement is for teaching CTE-IT courses if the school district wants to use these courses as one of their CTE service areas and is required for those teachers who will be teaching specific technology courses as a new CTE program.

This endorsement stems from 2017 legislation aimed at getting high-quality computer science courses into the classroom and ensuring that Iowa students develop foundational skills in computer science. Along with calling for the BOEE to determine what a teacher’s endorsement in computer science would look like, the legislation also established a computer science professional development fund and formed a computer science education work group to provide the General Assembly with recommendations for how high-quality computer science courses could meet mathematics or science requirements in high school.

### Key findings

- Since 2014, a total of 285 endorsements have been granted: 24 for K-8 STEM, 15 for 5-8 STEM, six for K-12 STEM Specialist, 80 for 5-12 Engineering, and 160 for 5-12 CTE Information Technology (Table 18).
- In 2019, 210 endorsements were granted: 12 for K-8 STEM, 7 for 5-8 STEM, 3 for K-12 STEM Specialist, 28 for 5-12 Engineering, and 160 for 5-12 CTE Information Technology (Figure 24).
- Seven Iowa colleges and universities currently offer the STEM endorsement—Buena Vista University, Dordt University, Drake University, Grandview University, Morningside College, Saint Ambrose University, and the University of Northern Iowa (Table 19).

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<sup>1</sup> See <https://boee.iowa.gov/endorsements/endorsements-list> for a description of the authorization, program requirements, and content for each.

- All seven offer endorsements in K-8 STEM and 5-8 STEM. Drake University also offers the K-12 STEM Specialist endorsement.
- The University of Iowa offers a Master of Science in STEM Education, Drake University offers a Master of Science in Education in STEM, and the University of Northern Iowa offers a Minor in STEM Education.

Table 18. Number of Iowa educators with STEM endorsements, 2014-2019

STEM Area Endorsement	Females	Males	2014	2015	2016	2017	2018	2019	Total
K-8 STEM	20	4	1	1	0	2	8	12	24
5-8 STEM	12	3	0	0	1	1	6	7	15
K-12 STEM Specialist	5	1	1	1	0	0	1	3	6
5-12 Engineering	29	51	1	5	8	15 <sup>1</sup>	26	28	80
5-12 CTE Information Technology	91	69						160	160
Total (educators)	157	128	3	7	9	15 <sup>2</sup>	41	210	285

Source: Iowa Department of Education, Bureau of Information and Analysis Services, Basic Educational Data Survey (BEDS), 2019

1. Annual subtotals through 2017 sum to 29 because conditional and standard licenses are counted separately. For example, if an educator received a conditional license in early 2016, and then added it to his/her standard license later in 2016, the annual count would show both for that person.
2. For the purpose of reporting totals, 15 unduplicated educators received the 5-12 Engineering endorsement in 2017.

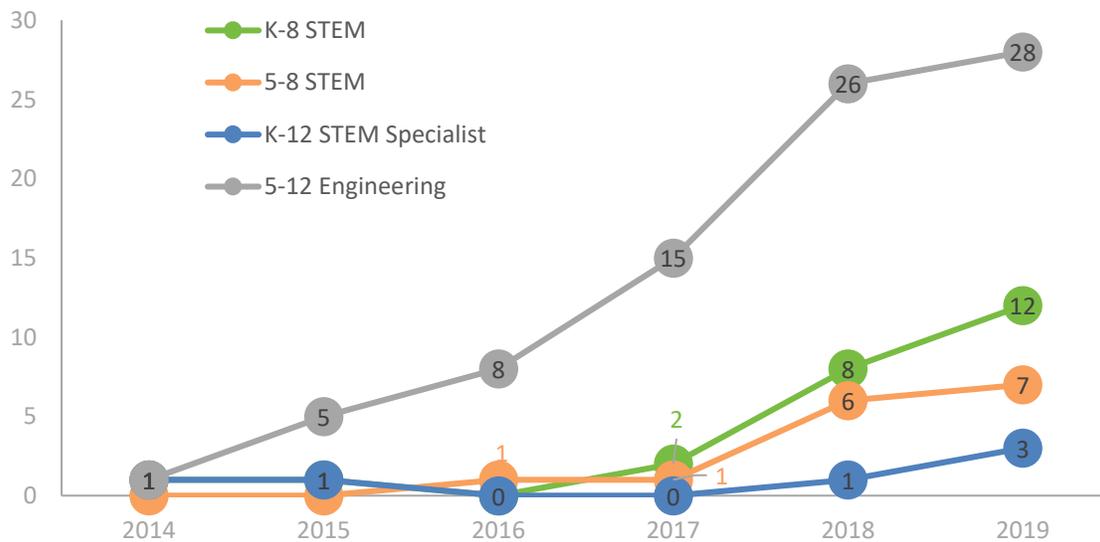


Figure 24. Number of Iowa educators with STEM endorsements, 2014-2019

Table 19. Iowa colleges and universities with STEM endorsement programs in 2019

College/University <sup>1,2</sup>	K-8 STEM Endorsement	5-8 STEM Endorsement	K-12 STEM Specialist Endorsement	STEM Degree	STEM Education Minor
Buena Vista University	X	X			
Dordt University	X	X			
Drake University	X	X	X	MSE in STEM Education	
Grandview University	X	X			
Morningside College	X	X			
Saint Ambrose University	X	X			
University of Iowa				MS in STEM Education	
University of Northern Iowa	X	X			Minor in STEM Education

Source: Iowa Board of Educational Examiners: <https://boee.iowa.gov/endorsement/k-8-stem>; <https://boee.iowa.gov/endorsement/5-8-stem>; <https://boee.iowa.gov/endorsement/k-12-stem-specialist>.

1. Buena Vista University started offering STEM Endorsements in Fall of 2017 after receiving a \$500,000 endowment to enhance their STEM program in January 2017 (personal communication with BVU staff). <http://www.bvu.edu/academics/programs/endorsements>  
<http://www.bvu.edu/bv/family-association/detail.dot?id=031e9264-0e35-443e-8bbc-cd573bcae85c>
2. No records for Iowa colleges and universities with STEM endorsement programs in 5-12 engineering and CTE Info Tech were located.

## Indicator 11: Community college awards in STEM fields

**Data source** Iowa Department of Education, Division of Community Colleges

Awards include diplomas, certificates, Associate's degrees, and other awards as identified and classified by the Iowa Department of Education Division of Community Colleges. The Iowa Department of Education classifies career and technical education programs into occupational "career clusters", following the National Career Clusters Framework. Four of these (architecture and construction, health sciences, information technology, and STEM) were tracked for the purposes of Indicator 11.

Note there are differences in operational definitions of STEM awards/degrees depending on the data source. In addition, defining "STEM degrees" is a moving target, and may be more broad or narrow depending on the data source. Indicator 15 also includes information on STEM degrees from Iowa's community colleges using Classification of Instructional Programs (CIP) codes compared to awards as reported by career cluster here. STEM awards by career cluster will be broader in definition. STEM degrees defined by CIP codes will be more specific.

### Key findings

- In 2019, 3,819 students enrolled in Iowa's community colleges in degree fields categorized by career clusters in architecture and construction, information technology, and STEM. An additional 11,265 students were enrolled in health sciences (Table 18).
- When assessed by career cluster, enrollment in STEM fields has decreased 33% at Iowa's community colleges.
- A total of 5,994 awards in STEM-related fields as categorized by career cluster were awarded by Iowa's community colleges in 2019 (Table 21). This is an increase of 87 awards (1%) from 2018 (from 5,907 awards in 2018 to 5,994 in 2019), and a 13% increase since 2013.
- Overall, there were notable increases in the number of awards from Iowa's community colleges from 2013 to 2019, with awards among males increasing by 30%, and 7% among females. Notably in 2019, awards to minority graduates increased 31% compared to 2013.

Table 20. Community college enrollment by career cluster

Career cluster <sup>1</sup>	2013	2015	2017	2019	% Change 2013 to 2019
Architecture and Construction	2,082	1,795	1,653	1,473	-29%
Information Technology	2,607	2,378	2,510	2,126	-18%
Science, Technology, Engineering, and Mathematics	245	261	308	220	-10%
Health Science	17,600	14,969	12,629	11,265	-36%
<b>TOTAL</b>	<b>22,534</b>	<b>19,403</b>	<b>17,100</b>	<b>15,084</b>	<b>-33%</b>

Source: Iowa Department of Education, Division of Community Colleges. (2019).  
*The annual condition of Iowa's community colleges: 2018.*

Retrieved from <https://www.educateiowa.gov/document-type/condition-community-colleges>

1. Definitions of Career Clusters can be obtained from <http://www.careerclusters.org/>

Table 21. Community college awards by career cluster

	2013	2015	2017	2019	% Change 2013 to 2019
<b>Architecture and Construction<sup>1,2</sup></b>					
Total	566	852	796	828	46%
Male <sup>3</sup>	521	771	754	784	50%
Female	32	71	38	43	34%
White	326	693	609	654	101%
Minority	79	110	158	155	96%
<b>Information Technology</b>					
Total	490	513	665	698	42%
Male	374	419	550	561	50%
Female	113	89	111	136	20%
White	330	430	531	522	58%
Minority	61	56	94	126	107%
<b>Science, Technology, Engineering, and Mathematics</b>					
Total	78	104	116	75	-4%
Male	45	58	89	66	47%
Female	22	42	20	6	-73%
White	53	69	87	55	4%
Minority	8	19	19	13	63%
<b>Health Science</b>					
Total	4,173	4,883	4,624	4,393	5%
Male	561	611	627	539	-4%
Female	3,584	4,250	3,985	3,828	7%
White	3,336	4,051	3,693	3,350	0%
Minority	706	621	745	827	17%
<b>TOTAL<sup>3</sup></b>					
Total	<b>5,307</b>	<b>6,352</b>	<b>6,201</b>	<b>5,994</b>	<b>13%</b>
Male	1,501	1,859	2,020	1,950	30%
Female	3,751	4,452	4,154	4,013	7%
White	4,045	5,243	4,920	4,581	13%
Minority	854	806	1,016	1,121	31%

Source: Iowa Department of Education, Division of Community Colleges. (2019). *The annual condition of Iowa's community colleges: 2018*

Retrieved from <https://www.educateiowa.gov/document-type/condition-community-colleges>

1. Awards include diplomas, certificates, Associate's degrees, and "other" awards as identified and classified by the Iowa Department of Education Division of Community Colleges. The Iowa Department of Education classifies career and technical education programs into occupational "career clusters," following the National Career Clusters Framework.
2. Definitions of Career Clusters can be obtained from <http://www.careerclusters.org/>
3. Subgroup totals do not include students with unknown/unreported gender or race. Sums of subgroup data not equal to the total are due to missing data.

## Indicator 12: College and university enrollment and degrees in STEM fields

**Data source** Integrated Postsecondary Education Data System (IPEDS)

This indicator includes information on enrollment, bachelor's degrees, master's degrees, and doctoral degrees conferred by 4-year public universities, private non-profit colleges, and private for-profit colleges. Information on associate's degrees from Iowa's 2-year community colleges is also included here applying the same operational definition of STEM degrees and using the same data set as used to determine STEM degrees from Iowa's 4-year colleges and universities. This allows for better proportional comparisons by college type.

Note that the definition of what constitutes a "STEM degree" has evolved in the past five to ten years nationwide. The methods for the current annual report follow the methods used since 2014-2015. The tables below utilize a basic analysis of IPEDS database using a composite of primary 2-digit Classification of Instructional Programs (CIP) code categories that reflect STEM, STEM-related, and health science degrees. This is a slight modification of a more specific, 6-digit, CIP code definition of STEM degrees that was developed to correspond with the standard occupational classification (SOC) codes used in tracking STEM workforce developed by the Standard Occupational Classification Policy Committee (SOCPC) for the Office of Management and Budget. Additional documentation on the STEM classification process and recommendations can be found at [www.bls.gov/soc](http://www.bls.gov/soc).

### Key findings

- From 2012-2013 to 2017-2018, there has been a 6% decrease in STEM awards at Iowa's 2-year community colleges, a 35% increase at 4-year public, and a 21% 4-year private (not-for-profit) colleges and universities, respectively (Table 23).
- During the same time period, health science degrees have increased 2% overall at Iowa's 2-year and 4-year, public and private non-profit colleges and universities (Table 24).
- From 2012-2013 to 2017-2018, there has been a 5% increase in STEM degrees awarded to females at Iowa's 2-year community colleges (from 214 degrees in 2012-2013 to 224 degrees in 2017-2018), while the number of degrees awarded to males decreased 8% (from 961 degrees in 2012-2013 to 881 degrees in 2017-2018).
- In 2017-2018, approximately 33% of the STEM and STEM-related degrees awarded by Iowa's 4-year public universities were conferred to females, compared to about 20% to females at Iowa's 2-year community colleges, and 37% at Iowa's 4-year, private not-for-profit colleges and universities (Table 25).
- The number of STEM and STEM-related degrees awarded to students who are Black / African American increased 41% at 4-year public, and 13% at private, 4-year not-for profit colleges and universities in Iowa since 2012-2013 (Table 27). Despite the increase in the number of degrees,

the proportions of degrees conferred upon Black / African American students has remained stable at around 2-3% of all degrees per year.

- The number of STEM and STEM-related degrees awarded to students who are Hispanic increased 45% at 2-year, 111% at 4-year public, and 28% at private, 4-year not-for profit colleges and universities in Iowa since 2012-2013. Despite the increase in the number of degrees, the proportion of degrees awarded to Hispanic students has remained stable at around 2-4% of all degrees per year.

Table 22. Four-year institutions' fall enrollment, 2012 to 2018

STEM & STEM-Related (excludes Health Sciences)	2012	2014	2016	2018	% change 2012 to 2018
<b>4-year public universities</b>					
Undergraduate	13,294	14,524	14,331	16,154	22%
Graduate/Professional	3,145	3,357	3,361	3,277	4%
Subtotal	16,439	17,881	17,692	19,431	18%
<b>Private, 4-year, not-for-profit</b>					
Undergraduate	4,308	4,555	4,461	4,178	-3%
Graduate/Professional	13	20	60	56	331%
Subtotal	4,321	4,575	4,521	4,234	-2%
Total, non-profit	20,760	22,456	22,213	23,665	14%
<b>Private, 4-year, for-profit</b>					
Undergraduate	139	73	147	126	-9%
Graduate/Professional	0	0	0	0	
Total, for-profit	139	73	147	126	-9%
Grand total	20,899	22,529	22,286	23,791	14%
<hr/>					
					% change
<b>Health Science Degrees</b>	<b>2012</b>	<b>2014</b>	<b>2016</b>	<b>2018</b>	<b>2012 to 2018</b>
4-year public universities	962	990	982	995	3%
Private, 4-year, not-for-profit	0	0	0	0	
Private, 4-year, for-profit	0	0	0	0	

Source: National Center for Education Statistics, IPEDS Data Center, 2019

STEM & STEM related degrees include (2-digit CIP): Engineering (14), Biological Sciences/Life Sciences (26), Mathematics (27), and Physical Sciences (40).

Health Science degrees include (6-digit CIP): Dentistry (51.0401), Medicine (51.1201).

Table 23. Number of STEM and STEM-related degrees awarded by Iowa's 2-year and 4-year colleges and universities

STEM & STEM-Related (excludes Health Sciences)	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	% change 2012/13 to 2017/18	% change 2015/16 to 2017/18
2-year community colleges								
Associate's degree	1,175	1,256	1,250	1,152	1,196	1,105	-6%	-8%
Subtotal	1,175	1,256	1,250	1,152	1,196	1,105	-6%	-8%
4-year public universities								
Bachelor's	3,235	3,564	3,809	3,946	4,195	4,405	36%	5%
Graduate/Professional	1,025	1,095	1,066	1,179	1,191	1,331	30%	12%
Subtotal	4,260	4,659	4,875	5,125	5,386	5,736	35%	6%
Private, 4-year, not-for-profit								
Associate's Degree	3	7	5	7	8	7	133%	-13%
Bachelor's	1,357	1,333	1,439	1,466	1,482	1,459	8%	-2%
Graduate/Professional	188	183	190	201	375	404	115%	8%
Subtotal	1,548	1,523	1,634	1,674	1,865	1,870	21%	0%
Total, non-profit	6,983	7,438	7,759	7,951	8,447	8,711	25%	3%
Private, 4-year, for-profit								
Associate's Degree	456	378	304	211	251	260	-43%	4%
Bachelor's	579	465	333	291	308	295	-49%	-4%
Graduate/Professional	202	214	227	143	126	99	-51%	-21%
Total, for-profit	1,237	1,057	864	645	685	654	-47%	-5%
Grand total	8,220	8,495	8,623	8,596	9,132	9,365	14%	3%

Source: National Center for Education Statistics, IPEDS Data Center, 2019

STEM & STEM related degrees include (2-digit CIP): Engineering (14), Biological Sciences/Life Sciences (26), Mathematics (27), and Physical Sciences (40).

Table 24. Number of health science degrees awarded by Iowa's 2-year and 4-year colleges and universities

Health Science Degrees	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	% change 2012/13 to 2017/18	% change 2015/16 to 2017/18
2-year community colleges								
Associate's degree	2,133	2,107	2,124	1,997	1,843	1,878	-12%	2%
Subtotal	2,133	2,107	2,124	1,997	1,843	1,878	-12%	2%
4-year public universities								
Bachelor's	435	546	472	571	539	546	26%	1%
Graduate/Professional	949	914	883	844	895	933	-2%	4%
Subtotal	1,384	1,460	1,355	1,415	1,434	1,479	7%	3%
Private, 4-year, not-for-profit								
Associate's degree	308	292	291	222	163	137	-56%	-16%
Bachelor's	1,086	1,172	1,274	1,322	1,352	1,340	23%	-1%
Graduate/Professional	1,532	1,548	1,613	1,544	1,720	1,713	12%	0%
Subtotal	2,926	3,012	3,178	3,088	3,235	3,190	9%	-1%
Total, non-profit	6,443	6,579	6,657	6,500	6,512	6,547	2%	1%
Private, 4-year, for-profit								
Associate's degree	989	1,378	1,492	1,474	1,198	826	-16%	-31%
Bachelor's	1,393	1,439	1,656	1,834	1,578	1,308	-6%	-17%
Graduate/Professional	455	503	729	792	990	1,085	138%	10%
Total, for-profit	2,837	3,320	3,877	4,100	3,766	3,219	13%	-15%
Grand total	9,280	9,899	10,534	10,600	10,278	9,766	5%	-5%

Source: National Center for Education Statistics, IPEDS Data Center, 2019

Health Science degrees include (6-digit CIP): Dentistry (51.0401), Medicine (51.1201).

Table 25. Gender distribution of STEM and STEM-related degrees awarded by Iowa's 2-year and 4-year colleges and universities

STEM & STEM-Related (excludes Health Sciences)	2012/13				2017/18				% change 2012/13 to 2017/18
	Associate's	Bachelor's	Graduate/ Professional	Subtotal	Associate's	Bachelor's	Graduate/ Professional	Subtotal	
2-year public universities	1,175			1,175	1,105			1,105	-6%
Male	961			881	881			80%	-8%
Female	214			224	224			20%	5%
4-year public universities		3,235	1,025	4,260		4,405	1,331	5,736	35%
Male		2,227	704	69%		3,009	860	67%	32%
Female		1,008	321	31%		1,396	471	33%	40%
Private, 4-year, not-for-profit	3	1,357	188	1,548	7	1,459	404	1,870	21%
Male	3	763	148	4	4	827	342	63%	28%
Female	0	594	40	3	3	632	62	37%	10%
Private, 4-year, for-profit	456	579	202	1,237	260	295	99	654	-47%
Male	358	411	127	211	211	227	68	77%	-44%
Female	98	168	75	49	49	68	31	23%	-57%

Source: National Center for Education Statistics, IPEDS Data Center, 2019

STEM & STEM related degrees include (2-digit CIP): Engineering (14), Biological Sciences/Life Sciences (26), Mathematics (27), and Physical Sciences (40).

Table 26. Gender distribution of health science degrees awarded by Iowa's 2-year and 4-year colleges and universities

Health science degrees	2012/13				2017/18				% change, 2012/13 to 2017/18
	Associate's	Bachelor's	Graduate/ Professional	Subtotal	Associate's	Bachelor's	Graduate/ Professional	Subtotal	
2-year public universities	2,133			2,133	1,878			1,878	-12%
Male	214			10%	224			12%	5%
Female	1,919			90%	1,654			88%	-14%
4-year public universities		435	949	1,384		546	933	1,479	7%
Male		52	330	28%		66	311	25%	-1%
Female		383	619	72%		480	622	75%	10%
Private, 4-year, not-for-profit	308	1,086	1,532	2,926	137	1,340	1,713	3,190	9%
Male	41	140	658	29%	17	178	714	28%	8%
Female	267	946	874	71%	120	1,162	999	72%	9%
Private, 4-year, for-profit	989	1,393	455	2,837	826	1,308	1,085	3,219	13%
Male	55	195	56	11%	390	319	173	27%	188%
Female	934	1,198	399	89%	436	989	912	73%	-8%

Source: National Center for Education Statistics, IPEDS Data Center, 2019

Health Science degrees include (6-digit CIP): Dentistry (51.0401), Medicine (51.1201).

Table 27. Racial/ethnic distribution of STEM and STEM-related degrees awarded by Iowa's 2-year and 4-year colleges and universities

STEM & STEM-Related (excludes Health Sciences)	2012/13				2017/18				% change 2012/13 to 2017/18
	Associate's	Bachelor's	Graduate/ Professional	%	Associate's	Bachelor's	Graduate/ Professional	%	
2-year community colleges									
White	1,040			89%	966			87%	-7%
Black / African American	13			1%	28			3%	115%
Hispanic	22			2%	32			3%	45%
Other	100			9%	79			7%	-21%
4-year public universities									
White		2,556	501	72%		3,255	606	67%	26%
Black / African American		40	23	1%		62	27	2%	41%
Hispanic		85	22	3%		179	47	4%	111%
Other		554	479	24%		909	651	27%	51%
Private, 4-year, not-for-profit									
White	2	1,107	23	73%	6	1,138	11	62%	2%
Black / African American	0	37	8	3%	0	28	23	3%	13%
Hispanic	0	49	1	3%	0	62	2	3%	28%
Other	1	164	156	21%	1	231	368	32%	87%
Private, 4-year, for-profit									
White	277	200	66	44%	146	176	47	56%	-32%
Black / African American	55	55	29	11%	48	53	23	19%	-11%
Hispanic	20	19	17	5%	36	31	17	13%	50%
Other	104	305	90	45%	30	35	12	12%	-85%

Source: National Center for Education Statistics, IPEDS Data Center, 2019

STEM & STEM related degrees include (2-digit CIP): Engineering (14), Biological Sciences/Life Sciences (26), Mathematics (27), and Physical Sciences (40).

Table 28. Racial/ethnic distribution of health science degrees awarded by Iowa's 2-year and 4-year colleges and universities

Health Sciences	2012/13				2017/18				% change 2012/13 to 2017/18
	Associate's	Bachelor's	Graduate/ Professional	%	Associate's	Bachelor's	Graduate/ Professional	%	
2-year public universities									
White	1862			87%	1,563			83%	-16%
Black / African American	60			3%	103			5%	72%
Hispanic	48			2%	70			4%	46%
Other	163			8%	142			8%	-13%
4-year public universities									
White		367	733	79%		462	671	77%	3%
Black / African American		5	18	2%		11	16	2%	17%
Hispanic		10	20	2%		28	23	3%	70%
Other		53	178	17%		45	223	18%	16%
Private, 4-year, not-for-profit									
White	272	928	1277	85%	116	1,134	1,373	82%	6%
Black / African American	6	39	21	2%	4	56	48	3%	64%
Hispanic	11	25	48	3%	5	48	78	4%	56%
Other	19	94	186	10%	12	102	214	10%	10%
Private, 4-year, for-profit									
White	438	506	115	37%	426	735	527	52%	59%
Black / African American	91	140	102	12%	153	254	304	22%	114%
Hispanic	46	56	14	4%	122	156	78	11%	207%
Other	414	691	224	47%	125	163	176	14%	-65%

Source: National Center for Education Statistics, IPEDS Data Center, 2019

Health Science degrees include (6-digit CIP): Dentistry (51.0401), Medicine (51.1201).

## Indicator 13: Percentage of Iowans in workforce employed in STEM occupations

Data source Iowa Workforce Development

### Key findings

- Approximately 21% of Iowa’s occupations are in STEM fields (Table 29).
- From 2016-2026, Iowa’s STEM occupations are expected to grow 1.0% annually, compared to a 0.8% annual growth rate across all occupations (Table 30).
- On average in 2018, individuals in STEM occupations earned \$32.24 in mean wages and \$67,057 in mean salaries, compared to all occupations overall earning \$21.50 in mean wages and \$44,727 in mean salaries, respectively (Table 30).
- Among respondents to Iowa’s 2018 Laborshed Study overall, 44% of respondents employed in a STEM field were female, and 56% were male. However, when healthcare occupations are considered separately, only 28% of respondents employed in a STEM field were female compared to 80% of respondents who worked in healthcare (Table 31).

Table 29. Percentage of Iowans in workforce employed in STEM occupations

Time period	Total STEM employment	Total employment (all occupations)	% STEM of all occupations
2008-2018	358,960	1,762,260	20%
2010-2020	267,765	1,717,020	16%
2012-2022	257,230	1,758,205	15%
2014-2024	298,510	1,795,100	17%
2016-2026	383,300	1,821,755	21%

Source: Communications and Labor Market Information Division, Iowa Workforce Development

Available at:

[www.iowaworkforcedevelopment.gov/sites/search.iowaworkforcedevelopment.gov/files/documents/2018/stemjobs\\_statewide\\_112018.pdf](http://www.iowaworkforcedevelopment.gov/sites/search.iowaworkforcedevelopment.gov/files/documents/2018/stemjobs_statewide_112018.pdf)

Table 30. Iowa estimated employment in STEM fields: Projections, growth, and salaries, 2016/26

	2016 Estimated employment	2026 Projected employment	Annual growth rate	2018 Mean Wage (\$)	2018 Mean Salary (\$)
Management	112,180	116,200	0.4	\$49.26	\$102,458
Business & Financial Operations	25,695	29,370	1.4	\$34.21	\$71,146
Computer & Mathematical	32,230	37,180	1.5	\$37.68	\$78,382
Architecture & Engineering	16,445	18,490	1.2	\$33.65	\$69,982
Life, Physical, & Social Science	9,785	10,845	1.1	\$29.49	\$61,346
Postsecondary Business, Biological Science, & Nursing Teachers	7,960	9,290	1.7	\$48.42	\$100,718
Healthcare Practitioners & Technical	77,630	88,440	1.4	\$35.09	\$72,986
Healthcare Support	13,265	15,835	1.9	\$17.49	\$36,371
Installation, Maintenance, & Repair	24,265	26,445	0.9	\$23.67	\$49,235
Production	24,200	25,090	0.4	\$22.19	\$46,161
Other <sup>2</sup>	39,645	43,610	1.0	\$24.18	\$50,291
Total STEM Occupations <sup>1</sup>	383,300	420,805	1.0	\$32.24	\$67,057
Total All Occupations	1,821,755	1,976,480	0.8	\$21.50	\$44,727

Source: Communications and Labor Market Information Division, Iowa Workforce Development. Available at [www.iowaworkforcedevelopment.gov/sites/search.iowaworkforcedevelopment.gov/files/documents/2018/stemjobs\\_statewide\\_112018.pdf](http://www.iowaworkforcedevelopment.gov/sites/search.iowaworkforcedevelopment.gov/files/documents/2018/stemjobs_statewide_112018.pdf)

1. The acronym STEM, as used in this table, is a combined occupational group made-up of occupations from existing and/or established occupational groups adopted from the Office of Management and Budget's (OMB) Standard Occupational Classification (SOC) Manual. These occupations have a preponderance of tools and skills from Science, Technology, Engineering, and/or Mathematics. STEM occupations were defined using criteria by Iowa Workforce Development (IWD) and/or recommended by the SOC Policy Committee for OMB.
2. Other includes first-line supervisors of food preparation/servers, institutional/cafeteria cooks, graphic designers, audio/video/broadcast technicians, animal breeders, first-line supervisors of farming/fishing/forestry workers, animal breeders, forest/conservation workers, electricians, plumbers/pipefitters/steamfitters, fire fighters, detectives/criminal investigators, and statistical assistants.

Table 31. Distribution of males and females in STEM occupations, 2018

STEM Occupational Category <sup>1</sup>	%	%
	Male	Female
Management	56%	44%
Business & financial	47%	53%
Computer & mathematical	79%	21%
Architecture & engineering	90%	10%
Life, physical, and social science	60%	40%
Healthcare practitioners and technical	22%	78%
Healthcare support	6%	94%
Installation, maintenance, & repair	97%	3%
Production	81%	19%
Other STEM <sup>2</sup>	81%	19%
	Subtotal_STEM occupations, not incl. healthcare	72% 28%
	Subtotal_Healthcare and healthcare support	20% 80%
	TOTAL <sup>3</sup>	56% 44%

Source: Iowa Workforce Development Statewide Laborshed Survey (2018 Statewide Sample; n=4,045), Communications and Labor Market Information Division, Iowa Workforce Development

1. STEM occupations as used in this table are a combined occupational group using the Standard Occupational Classification Policy Committee (SOCPC) definition and additional criteria defined by Iowa Workforce Development. The Census STEM and STEM-related occupation code list is based on the recommendations of the SOC Policy Committee for the Office of Management and Budget (OMB). Additional documentation on the STEM classification process and recommendations can be found at [www.bls.gov/soc](http://www.bls.gov/soc).
2. Other includes firefighters; first-line supervisors of food preparation/servers; cooks, institution and cafeteria; first-line supervisors of construction trades and extraction workers; electricians; plumbers, pipefitters, and steamfitters; Sales, wholesale and manufacturing representatives, and engineers; and graphic designers.
3. The proportion of females in total in STEM occupations is largely driven by including healthcare occupations as a STEM field.

## Indicator 14: Job vacancy rates in STEM occupational areas

Data source Iowa Workforce Assessment Survey, Iowa Workforce Development

The Workforce Needs Assessment Survey is conducted by Iowa Workforce Development each year with Iowa employers to assess the demand and skills required for jobs in several sectors of the workforce.

### Key findings

- In 2018, there were an estimated 14,280 vacancies in STEM jobs statewide (Table 32).

Table 32. Estimated job vacancy rates in STEM occupational areas

Occupational Categories <sup>1</sup>	2012/13		2014/15		2016/17		2018	
	Vacancy Rate	Est. Vacancy	Vacancy Rate	Est. Vacancy	Vacancy Rate	Est. Vacancy	Vacancy Rate	Est. Vacancy
Architecture and Engineering	3%	593	6%	1,047	5%	860	3%	644
Community and Social Services	2%	355	3%	720	6%	1,313	4%	839
Computer and Mathematical Science	3%	752	6%	1,887	1%	435	2%	590
Farming, Fishing, and Forestry	3%	148	12%	683	16%	881	6%	305
Healthcare Practitioner and Technical	2%	1,837	3%	2,847	5%	4,128	3%	2,339
Healthcare Support	4%	1,678	3%	1,205	10%	4,672	8%	3,106
Life, Physical, and Social Science	1%	116	3%	355	1%	155	1%	97
Production	4%	3,870	2%	2,593	3%	5,335	4%	6,360
<b>Total Estimated Vacancies<sup>2</sup></b>		<b>9,349</b>		<b>11,337</b>		<b>17,779</b>		<b>14,280</b>

Source: Iowa Workforce Needs Assessment, Iowa Workforce Development, 2019

<https://www.iowaworkforcedevelopment.gov/wna>

1. Occupational Categories not included in this table are: Arts, Design, Entertainment, Sports, & Related; Building & Grounds Cleaning & Maintenance; Business & Financial Ops; Construction & Extraction; Education, Training, & Library; Food Preparation & Serving Related; Installation, Maintenance, & Repair; Legal; Management; Office & Administrative Support; Personal Care & Service; Protective Service; Sales & Related; and Transportation & Material Moving.
2. Vacancy data derived from the Iowa Workforce Development job bank, and reported in the Workforce Needs Assessment report for each respective year. Data may be limited for making longitudinal comparisons due to the changing number of employer websites that are indexed on the job bank in any given year. Numbers are also subject to changes in employers' job posting strategies. For example, over the course of three years, an employer may change their job-posting strategy and become more aggressive about posting and re-posting jobs, which would result in a big jump in the number of openings over the course of time.

## Section 3. Statewide STEM Survey

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To assess change in public awareness and attitudes toward STEM, a statewide public survey of Iowans was conducted from May to July 2019. The survey has been conducted annually by the University of Northern Iowa, Center for Social and Behavioral Research since 2012. In 2019, just over 1,000 Iowans from across the state participated in the telephone survey of both landline and cellular telephone numbers. Results were weighted to obtain point estimates that are representative of the adult population of Iowans.

This section is a condensed version of results from the 2019 statewide survey, with some comparisons to findings from previous years. For a full description of survey results, including methodology, survey instrument, item frequencies, and weighting information, please refer to the forthcoming technical report for the 2019 statewide survey.

### 2019 Survey Results

#### STEM awareness

Awareness of STEM was asked using both cued (i.e., response options listed) and uncued (i.e., open-ended) question formats. To gauge general awareness, Iowans were asked how much they had heard about PreK-12 education in Iowa using a 4-point scale of *A lot*, *Some*, *A little*, or *Nothing*. An estimated 23% of Iowans had heard *A little*, 23% *Some*, and 19% had heard *A lot* about PreK-12 STEM education in the past few months.

Awareness of education topics was also assessed in a more specific, cued question about how much they had heard about “Improving math, technology, science, and engineering education” in the past month. In 2019, 39% of Iowans said they had heard *A little* and 14% said they had heard *A lot* when education topics specific to STEM were described this way.

Prior to either using or defining the STEM acronym or asking structured questions about STEM education in the interview, respondents were asked an uncued, open-ended question to explore basic awareness and understanding of STEM when used as a stand-alone acronym. Responses were coded by the interviewer at the time of the interview into broad categories of common responses determined from prior years of the STEM survey.

About one-third of the uncued responses (32%) were an exact or close definition of STEM, and another 12% of responses described STEM as having something to do with education in general (Figure 25). Stem cells or stem cell research was referenced in 10% of responses. About one-third (37%) of responses were *I don't know* or *Nothing* comes to mind regarding the acronym STEM.

### UNCUED RECALL AND UNDERSTANDING OF STEM, 2019

Approximately one-third of respondents described an exact or close definition of STEM.

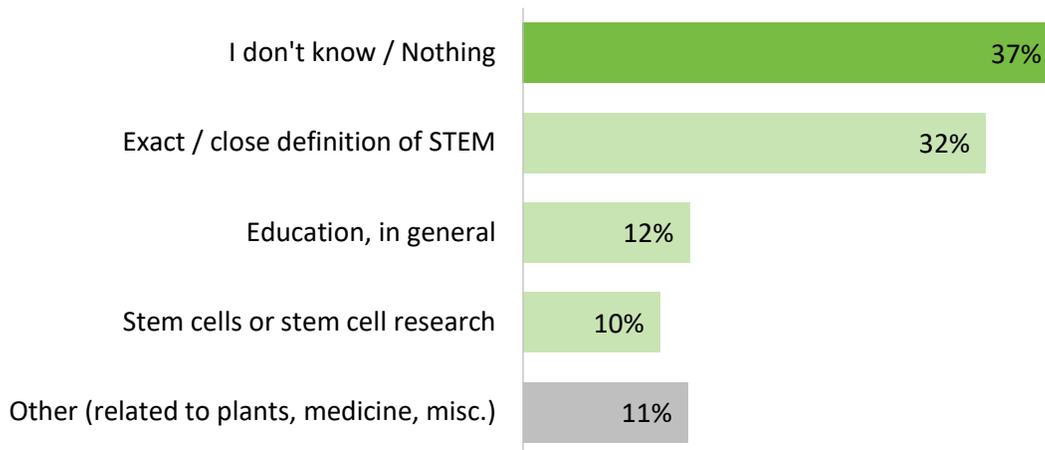


Figure 25. You may have heard about STEM education or STEM careers lately. What, if anything, comes to mind when you hear the letters S-T-E-M, or the word STEM?

To assess awareness of STEM specifically, lowans were asked “STEM stands for ‘science, technology, engineering, and mathematics.’ Have you read, seen, or heard of this before?” Approximately two-thirds lowans (65%) had heard something in the past month about PreK-12 education in general, and 53% reported that they had heard something about “improving math, science, technology, and engineering education.” When asked specifically about the STEM acronym, two-thirds (66%) of lowans had read, seen, or heard of STEM (Figure 26).

### HAVE YOU READ, SEEN, OR HEARD OF STEM? 2019

Two-thirds of lowans (66%) said ‘Yes.’ Awareness of STEM is significantly higher than measured in 2016 and prior years.

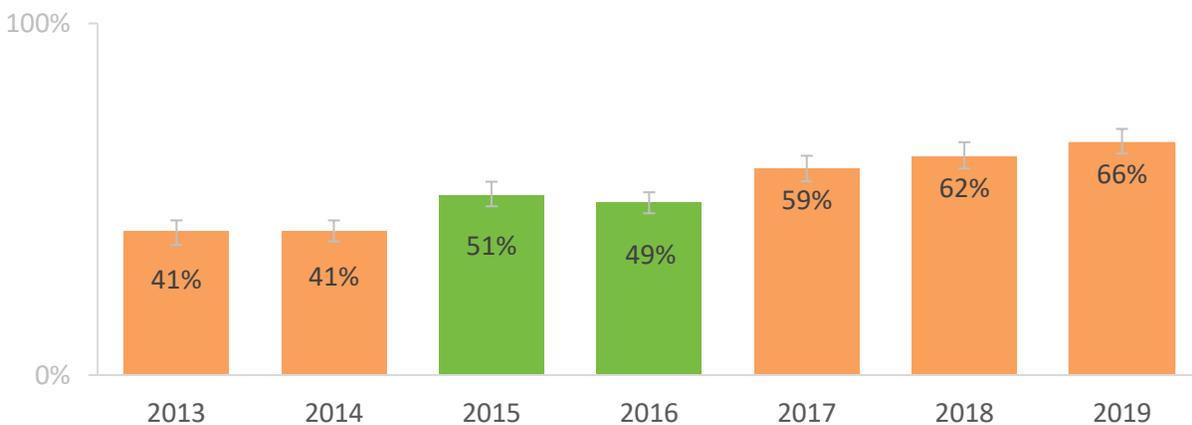


Figure 26. STEM stands for ‘science, technology, engineering, and mathematics.’ Have you read, seen, or heard of this before? (% Yes)

Chi-square tests of significance were used to compare awareness of STEM across select demographic variables. Subgroup analyses are useful for identifying which characteristics of lowans may be associated with more or less awareness of STEM. Bivariate analysis of awareness of STEM by gender ( $p < .01$ ), education ( $p < .01$ ), parent status (n/s), and place of residence (n/s) is presented in Figure 27.

**AWARENESS OF STEM BY POPULATION SUBGROUPS FROM 2013 TO 2019**

*Subgroup differences remain, but awareness of STEM has increased approximately 10% for nearly all subgroups since 2015. In 2019, a greater proportion of lowans with some college education or more had awareness of STEM compared to lowans with a high school education or less ( $p < .01$ ).*

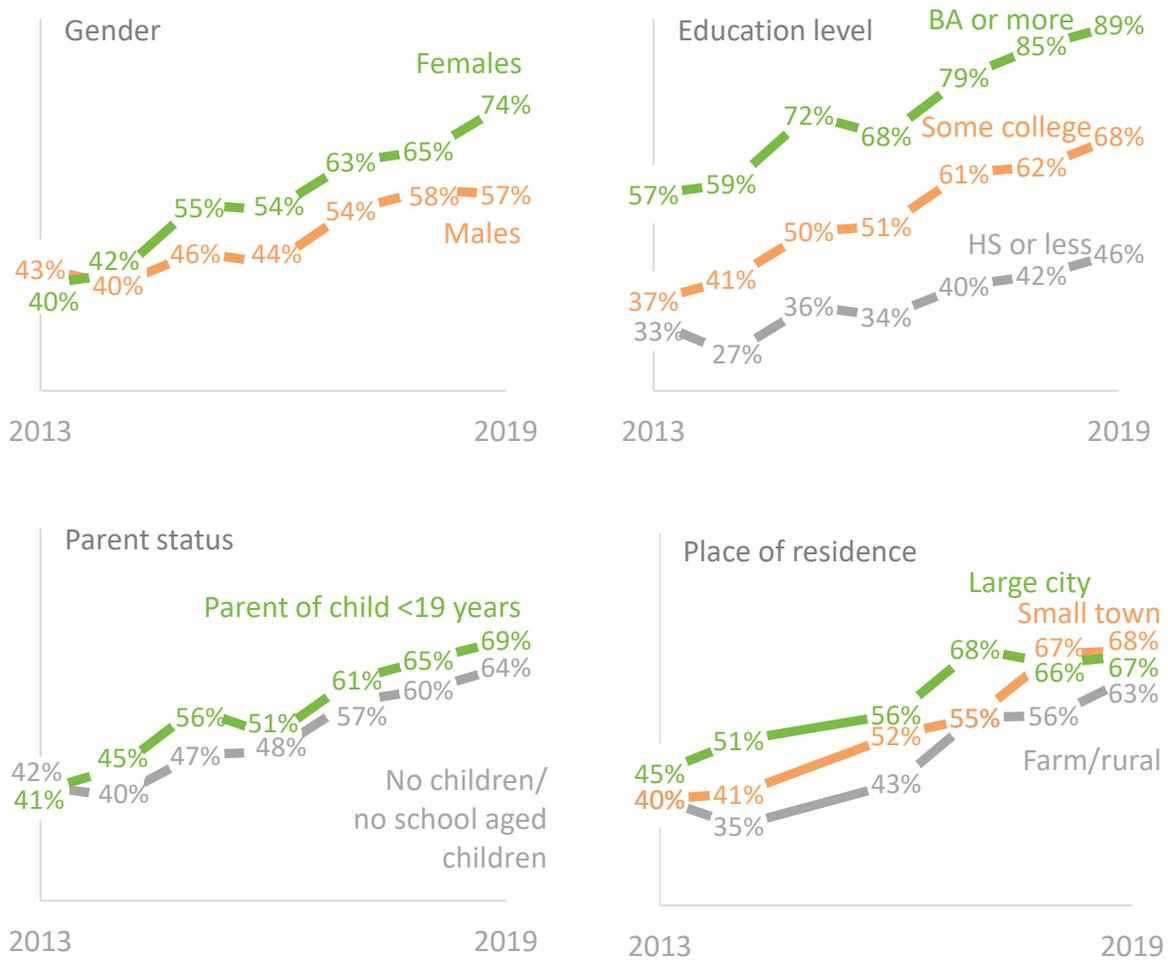
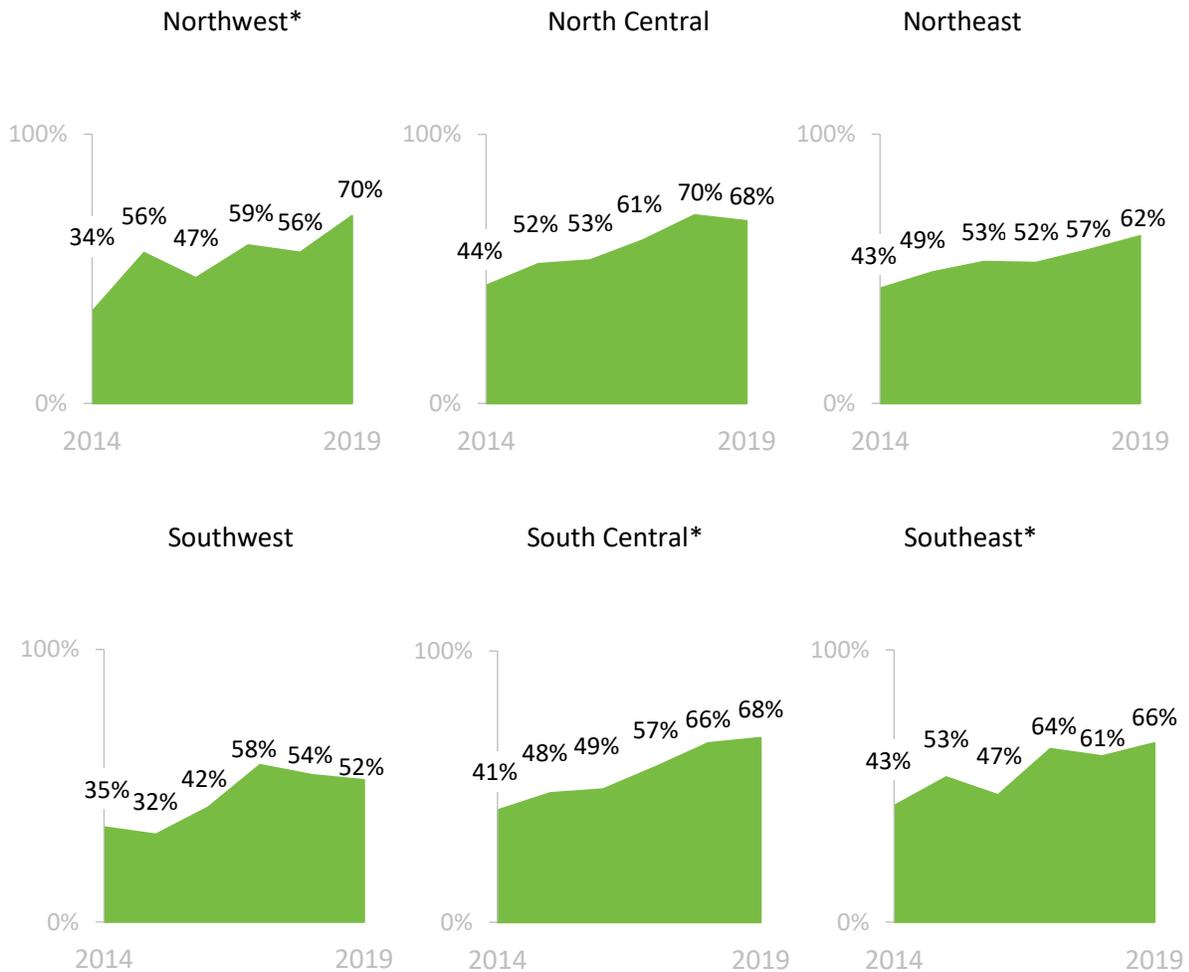


Figure 27. Trends in awareness of STEM by demographic subgroup, 2013-2019

In the last six years, all six STEM regions have shown an increase in STEM awareness, with the increases in the Northwest, North Central, Northeast, South Central, and Southeast STEM regions reaching statistical significance when comparing 2019 to 2014. Confidence intervals were used to determine statistical significance. The point estimate and 95% confidence intervals sets forth the upper and lower range of the “true” percentage in the population, so even though a trend upward or downward may be observed when comparing regions from one year to the next or with each other, the increase or decrease does not reach statistical significance when the 95% confidence intervals overlap.

**INCREASE IN STEM AWARENESS BY STEM REGION FROM 2014 TO 2019**

*Awareness of STEM increased significantly in the past year in the Northwest, South Central, and Southeast STEM regions compared to 2014.*



\*p<.05

Figure 28. Awareness of STEM by STEM region, 2014 to 2019

Awareness of statewide efforts to improve STEM education was also assessed by asking Iowans if they have read, seen, or heard anything about specific groups or events promoting STEM education and careers in Iowa or the phrase *Greatness STEMs from Iowans*. In the past year, an estimated 44% of Iowans had heard about a STEM event or programming in their local school district (Figure 29). About three in ten Iowans (30%) reported they had heard of the Governor’s STEM Advisory Council or STEM Day at the Iowa State Fair (30%). Almost one in four Iowans had heard of Iowa STEM BEST school-business partnerships (23%). The proportions in gray in Figure 29 show the percentage of Iowans with awareness of the respective event or activity from 2018. Not all events or activities are queried annually.

**AWARENESS OF GROUPS AND EVENTS PROMOTING STEM EDUCATION AND CAREERS**

*In the past year, over one-third of Iowans had heard of a STEM event or programming in their local school district; and one-quarter had heard of STEM Day at the Iowa State Fair or the STEM Advisory Council. Approximately one in five Iowans had heard of STEM day at the Capitol.*

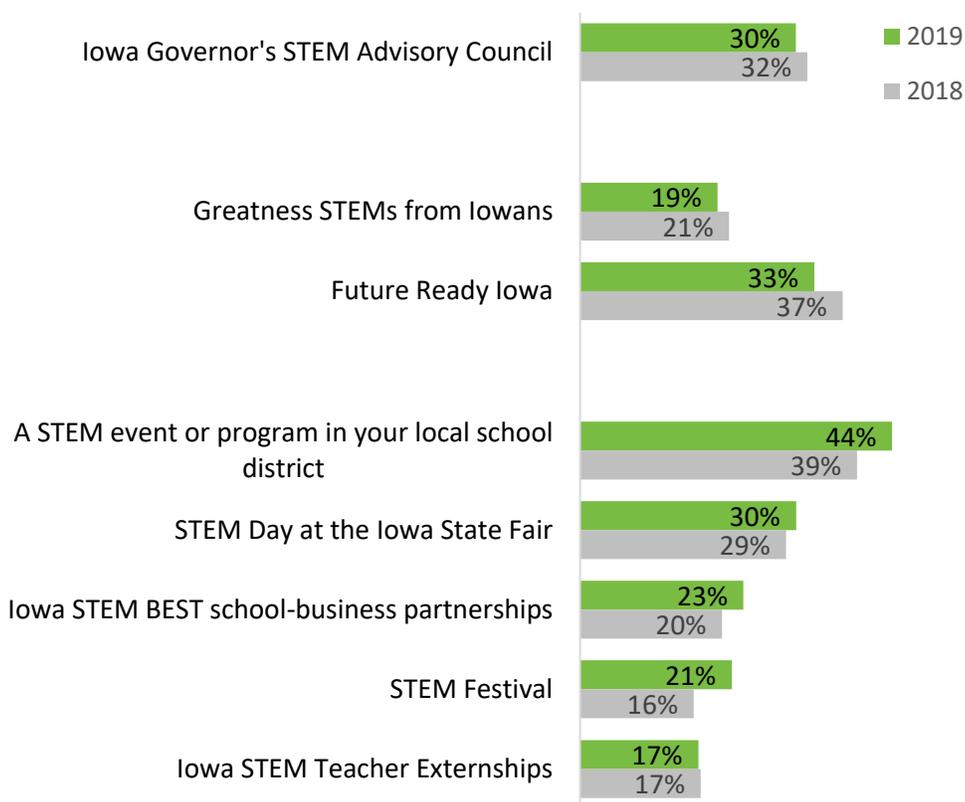


Figure 29. I’m going to read a short list of some groups promoting STEM education and careers. Please tell me how much you have heard, if anything, about each one in the past year. (% A lot/A little. Categories not mutually exclusive.)

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In 2019, 19% of Iowans recognized the slogan  
*Greatness STEMs from Iowans, and*

33% of Iowans recognized the slogan  
*Future Ready Iowa.*

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No respondents mentioned the slogan *Greatness STEMs from Iowans* when asked unprompted if they had read, seen, or heard any slogans or taglines about STEM. When asked specifically, 19% of Iowans recognized the slogan *Greatness STEMs from Iowans* and 33% of Iowans recognized *Future Ready Iowa*. For comparison, Iowans were also asked about one other slogan that to our knowledge had not been used in Iowa. Of this fabricated slogan, 18% said they had heard the slogan *The future of school is STEM!* This makes it uncertain whether or not *Greatness STEMs from Iowans* is any more or less recognizable than a slogan that has not been used in Iowa.

#### Interest and Attitudes toward STEM and the role of STEM in Iowa

Interest in STEM education was assessed by asking “In general, how interested, if at all, are you in the topic of preK-12 STEM education.” Two-thirds of Iowans indicated they were *Somewhat interested* (35%) or *Very interested* (34%) in the topic of preK-12 STEM education.



Figure 30. In general, how interested, if at all, are you in the topic of preK-12 STEM education?

Public attitudes toward STEM and views about the role of STEM in Iowa were assessed with a series of statements. The statements reflected attitudes about the role of STEM in Iowa, STEM’s role in economic and workforce development, and progress toward broadening participation in STEM. Response options utilized a 5-point scale of *strongly disagree*, *disagree*, *neither disagree or agree*, *agree*, or *strongly agree*, or the option to respond *Don’t Know/Not sure*<sup>2</sup>. Nine in ten Iowans had positive attitudes toward the need for resources to be put toward STEM in the state, and nine in ten agree or strongly agree with

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<sup>2</sup> Note when comparing 2019 results to previous years’ reports that Don’t Know responses were not included in the distribution of statewide survey results reported in 2016 and years prior.

statements that reflect the role of STEM in Iowa’s economic and workforce development (Figure 31). In an effort to gauge the public perception of STEM efforts as an economic development initiative versus an education initiative, lowans were asked their level of agreement with two separate statements. An estimated 76% of lowans agreed or strongly agreed with the statement, “The goal of the STEM initiative is to fill open jobs.” This compares to 86% of lowans who agreed or strongly agreed with the statement “The goal of the STEM initiative is about teaching specific STEM concepts in preK-12 schools.” This suggests that slightly more lowans view the initiative as an education effort while also recognizing the benefits toward workforce development.

**ATTITUDES TOWARD THE STEM INITIATIVE**

*Most lowans agree that more companies would move to Iowa if workers had a reputation for great science and math skills (60% agree/ 27% strongly agree).*

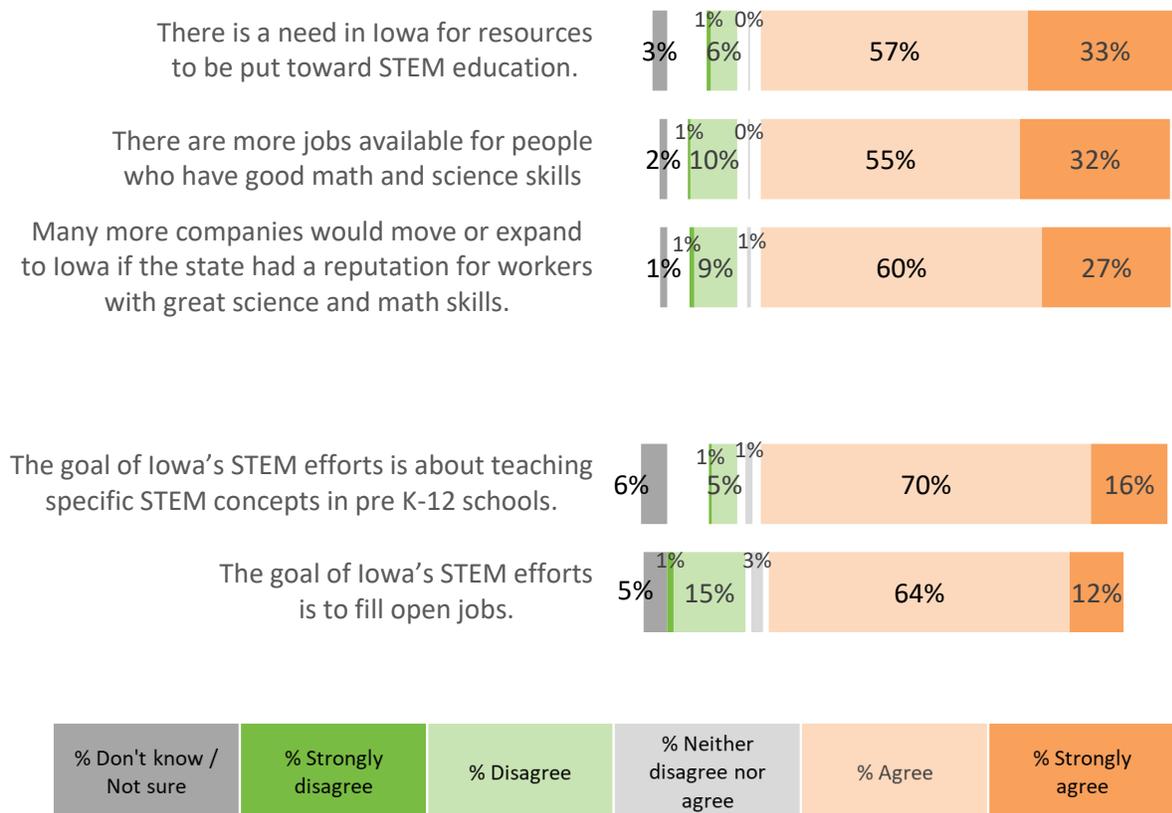


Figure 31. Public attitudes toward the STEM initiative

The survey also assessed lowans' perceptions about the STEM workforce in Iowa. A majority of lowans agreed or strongly agreed with statements on perceptions of progress to broaden participation in STEM for women, African Americans and Hispanics. Eight in ten lowans agreed that progress was being made to increase STEM jobs for women (62% agreed and 19% strongly agreed) (Figure 32). However, only six in ten agreed with statements about progress towards participation of African Americans (53% agreed and 7% strongly agreed) or Hispanics (47% agreed and 6% strongly agreed) in STEM jobs. Notably, a greater proportion of lowans reported *Don't know / Not sure*<sup>3</sup> or *Neither agree nor disagree* when asked their perceptions of progress towards broadening participation in the STEM workforce compared to other attitude statements.

**PERCEPTIONS OF EFFORTS TO BROADEN PARTICIPATION IN THE STEM WORKFORCE**

*Eight in ten lowans strongly agreed or agreed that progress is being made to increase the number of STEM jobs for women, compared to six in ten lowans who agreed that progress is being made to broaden participation of African Americans or Hispanics.*

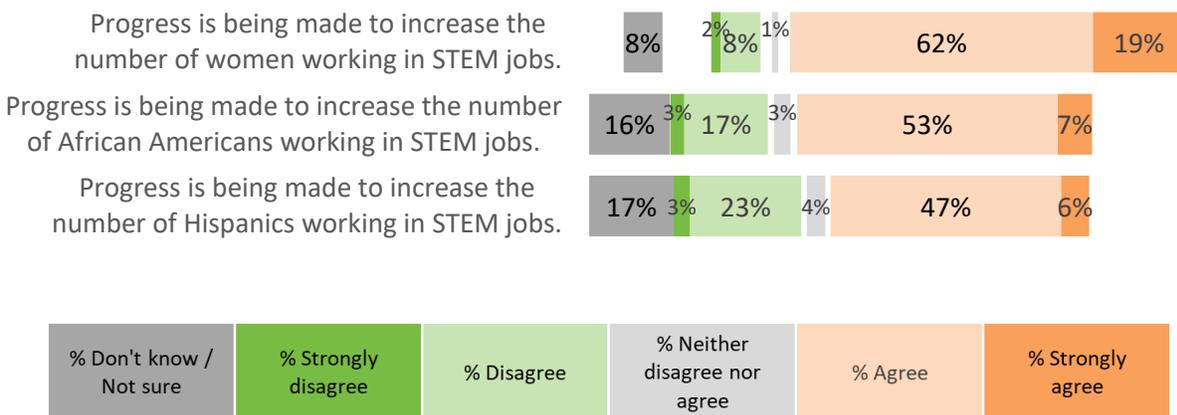


Figure 32. Perceptions of efforts to broaden participation in the STEM workforce

<sup>3</sup> Be aware when comparing 2019 results to previous years' reports as Don't Know responses were not included in the distributions of results reported in 2016 and years prior.

## Perceptions about STEM education

The statewide survey also assessed perceptions about STEM education in Iowa. Questions centered on support for STEM education, and opinions about how well schools in their community are teaching STEM subjects. The survey also assessed views on the importance of STEM education.

Much like previous years, nine in ten Iowans (95%) said STEM education **should** be a priority in their local school district, but only 58% said STEM education actually **is** a priority and another 13% said they didn't know if STEM education was a priority in their local school district. While still discrepant, this has been improving over time compared to 2015 when less than half (47%) said STEM education was a priority, and one in five (22%) didn't know.

Furthermore, nearly nine in ten Iowans (88%) support (56% very supportive and 32% somewhat supportive) state efforts to devote resources and develop initiatives to promote STEM education in Iowa (Figure 33).

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*In 2019, nine in ten Iowans (95%) thought STEM education **should** be a priority in their local school districts, but only 58% say it actually **was** a priority and another 13% **didn't know**.*

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### OVERALL SUPPORT FOR STEM EFFORTS REMAINS HIGH

*A large majority (88%) of Iowans support efforts to devote resources and develop initiatives to promote STEM education in Iowa; among those, over half (56%) said they were very supportive.*

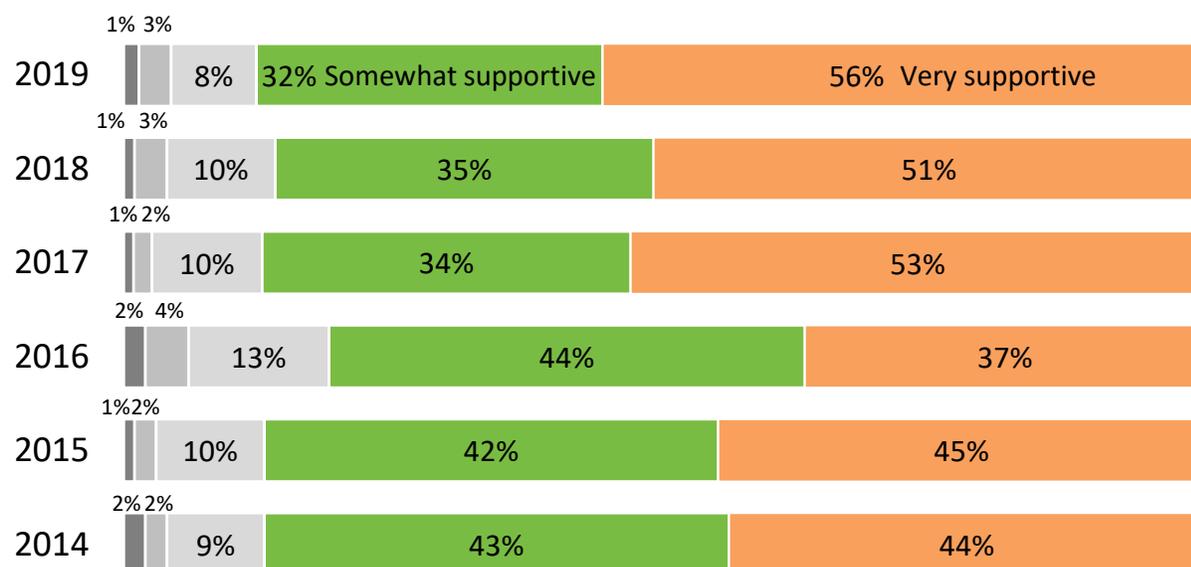


Figure 33. Overall, to what degree do you support or oppose state efforts to devote resources and develop initiatives to promote STEM education in Iowa? Would you say you are...  
(% Very opposed, Somewhat opposed, Neither, Somewhat supportive, Very supportive)

Attitudes about STEM education were assessed in a series of statements on the quality of STEM education, student preparation for post-secondary programs, and school-business partnerships. Iowans were split in their agreement with the statement “Overall, the quality of STEM education in Iowa is high.” Two-thirds of Iowans (64%) agreed or strongly agreed with this statement, 25% disagreed or strongly disagreed, and 9% didn’t know (Figure 34). This view did not differ by gender, education level, parent status, or urban or rural place of residence.

**ATTITUDES ABOUT STEM EDUCATION AND SCHOOL-BUSINESS PARTNERSHIPS**

*Nine in ten Iowans agreed (57% agreed / 33% strongly agreed) that it is important for businesses to be involved in STEM partnerships with schools in their region; however, 14% did not know if businesses in their area actually were involved with preK-12 schools.*

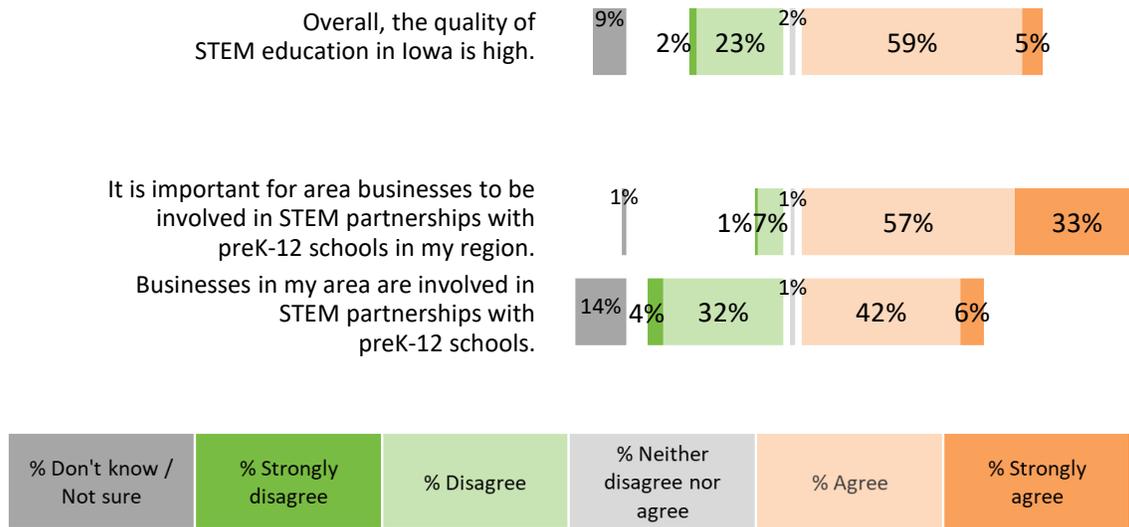


Figure 34. Attitudes about STEM education

**ATTITUDES ABOUT POST-SECONDARY STEM EDUCATION**

*Iowans recognize skilled trades as a viable STEM career pathway, and some awareness that not all STEM jobs require a 4-year degree or more. Just over half (57%) agreed that a 4-year college program or more is needed for a career in STEM.*

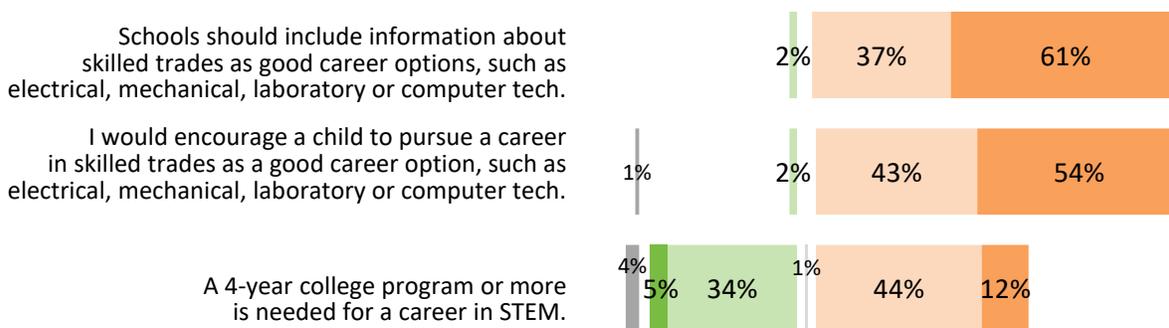


Figure 35. Attitudes about post-secondary STEM education

In response to the question “How well do you think schools in your community are teaching STEM subjects?,” nearly seven in ten lowans said teaching in science, technology, and mathematics is *excellent* or *good* in their community, but less than half (48%) rated engineering education this way (Figure 36).

**PERCEPTIONS OF QUALITY OF EDUCATION**

*Nearly seven in ten lowans rated the quality of science, technology, and mathematics education in their community as ‘Excellent’ or ‘Good,’ while less than half (48%) of lowans rated the quality of engineering education in their community that way.*

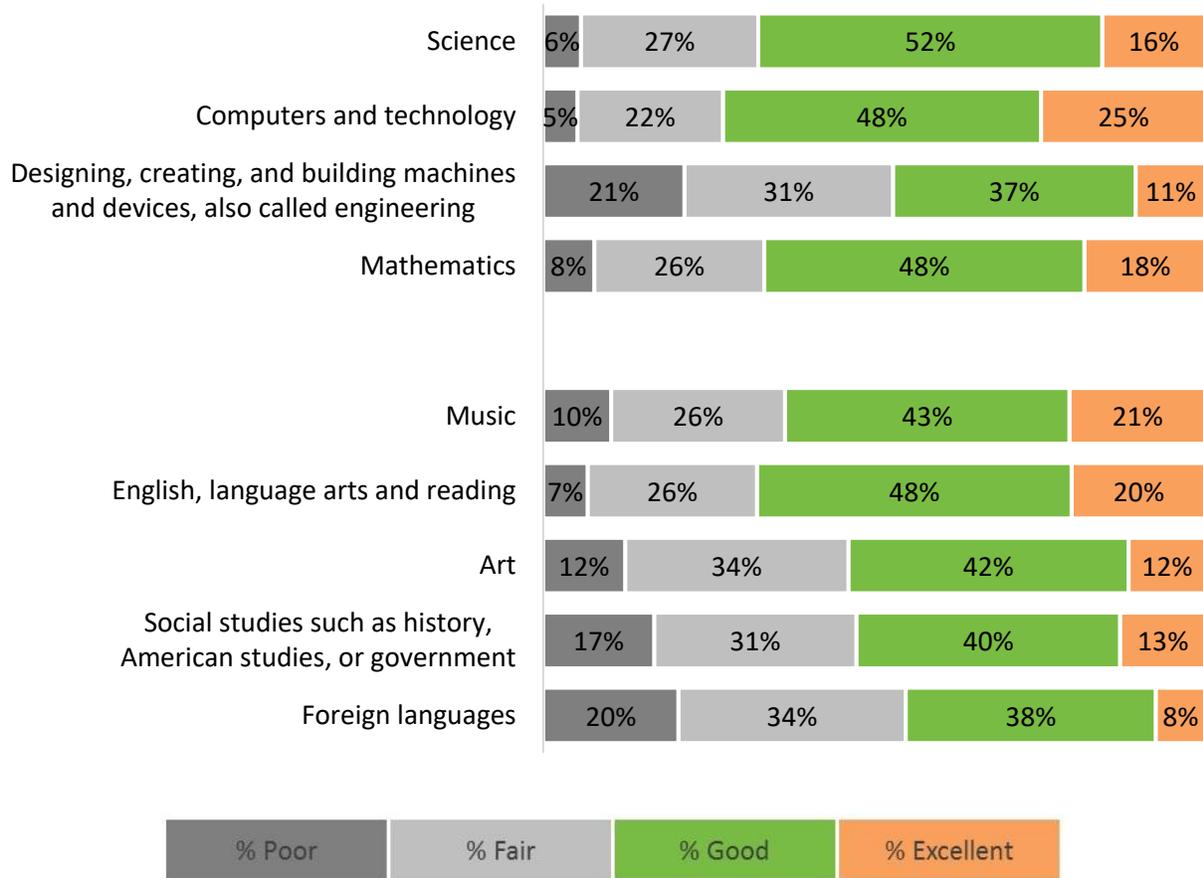


Figure 36. How well do you think the schools in your community are teaching each of the following subjects?

## Statewide STEM survey methodology, 2019

To measure public awareness of and attitudes toward STEM in Iowa, the UNI Center for Social and Behavioral Research has conducted an annual statewide public survey of adult Iowans since 2012. The survey is funded by the Iowa Governor's STEM Advisory Council (Award No. UNI-CSBR\_FY2019\_01). The survey instrument was first developed in 2012, and is reviewed and revised annually in consultation with the Council's Operations Team. Survey topics in 2019 included:

1. Awareness of STEM
2. Attitudes toward STEM and the role of STEM in Iowa
3. Perceptions and attitudes about STEM education
4. Demographics

The complete survey instrument used for 2019 data collection can be found in Appendix A.

**Population & Sampling Design** The 2019 Survey of Adult Attitudes toward STEM used a dual-frame random digit dial (DF-RDD) sample design that included both landline and cell phones. All samples were obtained from Marketing Systems Group (MSG). For 2019, the sample design was 80% cellular and 20% landline numbers, compared to a 70%/30% distribution used in 2018 and 2017. In 2016 and years prior, the study design included an oversample of demographic groups (i.e. Hispanic, Black / African American, or households of parents of children under 19) and a larger sample size. These sample design adjustments are important background when comparing results across years.

Within-household selection for landline calls randomly selected an adult member of the household using a modified Kish procedure. Respondents were Iowans who were at least 18 years of age or older at the time of the interview. Interviews were completed from May 22, 2019 through July 3, 2019, and averaged 19 minutes in length (Range: 12-51 minutes). Interviews were conducted in both English and Spanish with computer-assisted telephone interviewing (CATI).

A total of 1,088 interviews were completed. This included 1,011 (93%) interviews from the cellular RDD sample, and 77 (7%) interviews from the landline RDD sample. A total of 17 interviews were conducted in Spanish.

Response rates were calculated using the American Association for Public Opinion Research (AAPOR) RR3 calculation. The overall response rate was 23%. The response rate for the RDD landline was 16%, and the cell phone sample was 24%, respectively. The overall cooperation rate (AAPOR CR3) was 77%. The cooperation rate for interviews completed via cell phone (81%) was higher than for landline (48%).

**Weighting & Precision of Estimates** This report focuses on findings from the 2019 statewide survey, but also includes some select comparisons to findings from previous years.

The data were weighted in order to obtain point estimates that are representative of the adult population of Iowans on key characteristics including gender, age, ethnicity, race, education, place of residence, and cell-phone only versus other telephone households.<sup>4</sup> The post-stratification weights were computed with SAS (see [www.sas.com](http://www.sas.com)). These weighted data help adjust for any areas of over- or underrepresentation in the sample and are used to generalize results to the statewide population of

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<sup>4</sup> See Appendix B. Weighting Methodology Report for the 2019 data.

adult lowans, thus we refer to respondents as “lowans” throughout the report. Descriptive statistics, including frequencies and distributions were calculated for the total sample and for population subgroups including gender, education, parent status, and place of residence for select questions in the survey. Margin of sampling error taking into account the design effect is +1.9% for the overall sample and as high as +7.7% for the analyses using the smallest subgroups (Race subgroup: All other).

IBM SPSS Statistics 22 (see [www.ibm.com/software/analytics/spss/](http://www.ibm.com/software/analytics/spss/)) was used for initial data management and descriptive analysis, and SUDAAN v10.0 (see [www.rti.org/sudaan](http://www.rti.org/sudaan)) was used to estimate population estimates of responses. Analyses conducted in SUDAAN have been adjusted for the design effect<sup>5</sup> due to differential probabilities of selection, clustering and weighting. SUDAAN was also used for logistic regression to model some of the main findings of this study. Further explanation of this multivariate analysis (RLOGIST command in SUDAAN) can be found at [www.rti.org/sudaan](http://www.rti.org/sudaan).

Tests of significance included both the Wald Chi-square test and 95% confidence intervals of the weighted results. The significance level was set at  $p\text{-value} \leq 0.05$  (or 5%) for all analyses. For some variables, the Wald chi-square test was significant at  $p \leq 0.05$ , but the 95% confidence intervals overlapped or were separated by less than 1%. In these instances, the authors made the decision to interpret the subgroup differences as not significant since the tests were performed on point estimates. By definition, point estimates are the best estimation of the percentage of the population for any given variable, such as the estimated number and percentage of lowans with awareness of STEM based on the percentage of respondents with awareness in a random sample of adult lowans. 95% confidence intervals are values above and below the point estimate that indicate with 95% probability the upper and lower range of the “true” value in the population of adult lowans. Because the point estimate and 95% confidence intervals already represent an estimate of the percentage and upper and lower range of the “true” value in the population, it is judicious to conservatively interpret statistically significant subgroup differences when the 95% confidence intervals are so close.

Unless otherwise noted, percentages reflect the “weighted percent” of survey respondents. Percentages in the tables and figures were rounded to the nearest whole number, therefore percentage totals will range from 99% to 101% throughout the report. Unless otherwise noted, proportions reported in all charts and figures and all survey items described in the report are from cued responses (i.e., closed-ended questions).

## Demographic characteristics of the survey sample

Overall, respondents tended to be older and more educated than the general population of lowans. Weighting uses standard Census metrics of the Iowa population of men and women applied to the full survey sample yielding an overall correction and adjustment in the final weights which were used to compensate for issues related to gender and possible under- or overrepresentation of certain demographic groups. This correction is observed in the side-by-side comparison of the unweighted and weighted distributions of respondents by demographic characteristics in Table 33.

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<sup>5</sup> The Design Effect (DEFF) is a measure of estimated ratio between variances between cluster versus simple random sampling design in a weighted data analysis. See more information at [www.rti.org/sudaan](http://www.rti.org/sudaan).

Table 33. Demographic characteristics of respondents, 2019

	Sample size (n)	Unweighted %	Estimated % after weighting
Total Sample	1,088		
Gender			
Men	579	53%	49%
Women	509	47%	51%
Age Group			
18-34	274	25%	30%
35-54	317	29%	31%
55 and older	497	46%	39%
Ethnicity			
Hispanic, Latino, or Spanish origin	35	3%	7%
Non-Hispanic	1,047	97%	93%
Race			
White	1,022	94%	92%
Black / African American	24	2%	4%
Other	42	4%	4%
Education			
High school graduate/GED or less	198	18%	39%
Some college or technical school	465	43%	32%
4-year undergraduate or graduate degree	425	39%	29%
Employment			
Employed for wages	589	54%	55%
Self-employed	135	13%	12%
Homemaker	32	3%	4%
Student	32	3%	3%
Retired	239	22%	18%
Out of work / Unable to work	59	5%	8%
Annual gross household income			
Less than \$50,000	395	36%	45%
\$50,000 to less than \$100,000	398	37%	34%
\$100,000 or More	295	27%	21%
Missing			
Place of residence			
Rural / Small town (<5,000 pop.)	549	51%	45%
Large town (5,000-<50,000 pop.)	274	25%	30%
Urban (>50,000 pop.)	259	24%	25%
Parent status			
No, parent or guardian of 19 or younger	739	68%	65%
Yes, parent or guardian of 19 or younger	347	32%	35%

	Sample size (n)	Unweighted %	Estimated % after weighting
STEM Region			
Northwest	108	10%	10%
North Central	144	13%	12%
Northeast	186	17%	18%
Southwest	73	7%	7%
South Central	290	27%	27%
Southeast	283	26%	26%

Sums less than 1,088 due to respondents who answered 'Don't know' or 'Refused'; proportions greater than or less than 100% due to rounding.

## Appendix A: Statewide student interest inventory

Statewide standardized tests are taken annually by nearly every student in 3<sup>rd</sup> through 11<sup>th</sup> grade in the state of Iowa. The Iowa Assessments were administered from FY13 through FY18, and the Iowa Statewide Assessment of Student Progress were administered beginning in FY19. Since 2012-2013, an 8-item interest inventory has been added to the Iowa Assessments. In January 2016, an additional item was added at the request of the Council. Schools have the option to administer the inventory to their students. The Interest Inventory was developed in part to serve as a data source for both the Iowa STEM Indicators, and as a way to compare students who participate in Scale-Up Programs with all students statewide.

Two versions of the inventory were created with variations in question wording and response options to accommodate different grade levels. Response options for students in 3<sup>rd</sup> through 5<sup>th</sup> grade were *I like it a lot, It's okay, or I don't like it very much* for items one to seven, and *I would like it a lot, It would be okay, or I would not like it very much* for items eight and nine, respectively. Response options for grades 6<sup>th</sup> through 11<sup>th</sup> were *Very interested, Somewhat interested, or Not very interested* for all items.

Table. Statewide Student Interest Inventory

Grades 3 <sup>rd</sup> -5 <sup>th</sup>	Grades 6 <sup>th</sup> -11 <sup>th</sup>
1. How much do you like to create and build things?	1. How interested are you in designing, creating, and building machines and devices (also called engineering)?
2. How much do you like math?	2. How interested are you in math?
3. How much do you like science?	3. How interested are you in science?
4. How much do you like art?	4. How interested are you in art?
5. How much do you like reading?	5. How interested are you in English and language arts?
6. How much do you like using computers and technology?	6. How interested are you in computers and technology?
7. How much do you like social studies?	7. How interested are you in social studies (such as history, American studies, or government)?
8. When you grow up, how much would you like to have a job where you use science, computers, or math?	8. As an adult, how interested would you be in having a job that uses skills in science, technology, math, or engineering?
9. When you grow up, how much would you like to have a job in Iowa?	9. How interested are you in living in Iowa after you graduate and go to work?

Table. Demographics of Scale-Up program participants matched to Iowa Assessments (2012/13-2017/18) or Iowa Statewide Assessment of Student Progress (2018/19)

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Number of students on student participant list submissions							
	7,771	26,238	23,779	29,396	29,415	34,252	26,161
Number of Scale-Up students matched (match rate) <sup>1</sup>							
	6,225 (80%)	19,497 (74%)	15,905 (67%)	17,122 (58%)	19,102 (65%)	20,762 (61%)	13,585 (52%)
Gender distribution							
Female	44%	48%	46%	47%	48%	48%	48%
Male	56%	52%	54%	53%	52%	52%	52%
Race/ethnicity distribution							
White	87%	80%	84%	87%	84%	82%	80%
Black / African American	6%	5%	2%	3%	3%	4%	5%
Hispanic	3%	9%	9%	5%	8%	9%	9%
Other	4%	6%	5%	6%	6%	5%	6%
Grade level (n) <sup>23</sup>							
3 <sup>rd</sup> grade	12% (755)	13% (2,534)	10% (1,604)	13% (2,301)	17% (3,311)	19% (4,016)	17% (2,273)
4 <sup>th</sup> grade	13% (795)	9% (1,693)	11% (1,761)	16% (2,714)	19% (3,597)	21% (4,435)	22% (3,055)
5 <sup>th</sup> grade	13% (805)	13% (2,475)	14% (2,194)	17% (2,949)	19% (3,577)	19% (3,876)	16% (2,189)
6 <sup>th</sup> grade	19% (1,202)	11% (2,109)	14% (2,225)	14% (2,321)	11% (2,070)	11% (2,237)	14% (1,881)
7 <sup>th</sup> grade	7% (439)	17% (3,403)	12% (1,972)	19% (1,584)	7% (1,255)	9% (1,892)	15% (2,042)
8 <sup>th</sup> grade	21% (1,309)	24% (4,707)	12% (1,843)	12% (2,054)	7% (1,331)	7% (1,549)	10% (1,391)
9 <sup>th</sup> grade	9% (584)	3% (583)	4% (655)	4% (629)	3% (596)	3% (540)	3% (373)
10 <sup>th</sup> grade	3% (167)	2% (341)	3% (417)	4% (608)	8% (1,502)	1% (218)	1% (187)
11 <sup>th</sup> grade	3% (168)	2% (303)	3% (471)	2% (399)	2% (334)	1% (257)	1% (194)

1. Reflects distribution of Scale-Up program student participants matched to their Iowa Assessments (2012/13-2017/18) or Iowa Statewide Assessment of Student Progress (2018/19) scores alone regardless of a match to the STEM Interest Inventory.

Table A2. Interest Inventory participation summary, 2013-2014 to 2017-2018

2013/14		2014/15		2015/16		2016/17		2017/18	
n	Match rate	n	Match rate	n	Match rate	n	Match rate	n	Match rate
Total statewide participation in the Iowa Assessments									
346,774		346,914		350,270		351,355		354,336	
Total statewide Interest Inventory participation									
174,184	50%	215,134	62%	199,416	57%	202,041	58%	202,330	57%
Number of students on student participant list submissions									
26,238		23,779		29,396		29,415		34,252	
Scale-Up students matched to Iowa Assessments scores									
19,497	74%	15,905	67%	17,122	58%	19,102	65%	20,762	61%
Scale-Up students matched to Iowa Assessments scores <i>and</i> STEM Interest Inventory									
9,352	36%	10,907	46%	10,245	35%	10,971	37%	12,990	38%

**ITEM 1: Engineering**

**E1. How much do you like to create and build things?**

**MS/HS1. How interested are you in designing, creating, and building machines and devices (also called engineering)?**

Response Options		Scale-Up Students					All Students Statewide				
Grades 3-5	Grades 6-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12
I like it a lot	Very interested	6,981	54%	66%	34%	32%	81,017	40%	65%	30%	21%
It's okay	Somewhat interested	4,512	35%	30%	43%	40%	75,628	37%	30%	44%	39%
I don't like it very much	Not very interested	1,473	11%	4%	23%	29%	45,085	22%	5%	26%	39%
Total		12,966					201,730				

**ITEM 2: MATHEMATICS**

**E2. How much do you like math?**

**MS/HS2. How interested are you in math?**

Response Options		Scale-Up Students					All Students Statewide				
Grades 3-5	Grades 6-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12
I like it a lot	Very interested	4,519	35%	41%	25%	21%	58,327	29%	39%	26%	20%
It's okay	Somewhat interested	5,520	43%	42%	44%	39%	86,048	43%	42%	44%	42%
I don't like it very much	Not very interested	2,923	23%	16%	32%	39%	57,179	28%	19%	30%	39%
Total		12,962					201,554				

**ITEM 3: SCIENCE**

**E3. How much do you like science?**

**MS/HS3. How interested are you in science?**

Response Options		Scale-Up Students					All Students Statewide				
Grades	Grades	Total	Subtotal	Grades	Grades	Grades	Total	Subtotal	Grades	Grades	Grades
3-5	6-12	n	%	3-5	6-8	9-12	n	%	3-5	6-8	9-12
I like it a lot	Very interested	5,243	40%	47%	30%	27%	70,607	35%	45%	30%	28%
It's okay	Somewhat interested	5,583	43%	41%	46%	47%	88,678	44%	41%	46%	45%
I don't like it very much	Not very interested	2,136	16%	12%	24%	26%	42,102	21%	14%	24%	27%
Total		12,962					201,387				

**ITEM 4: ART**

**E3. How much do you like art?**

**MS/HS3. How interested are you in art?**

Response Options		Scale-Up Students					All Students Statewide				
Grades	Grades	Total	Subtotal	Grades	Grades	Grades	Total	Subtotal	Grades	Grades	Grades
3-5	6-12	n	%	3-5	6-8	9-12	n	%	3-5	6-8	9-12
I like it a lot	Very interested	6,780	52%	61%	41%	29%	87,705	44%	63%	38%	27%
It's okay	Somewhat interested	3,815	29%	28%	32%	32%	62,835	31%	27%	34%	34%
I don't like it very much	Not very interested	2,363	18%	12%	27%	39%	50,816	25%	10%	29%	40%
Total		12,958					201,356				

**ITEM 5: READING**

**E3. How much do you like reading?**

**MS/HS3. How interested are you in reading?**

Response Options		Scale-Up Students					All Students Statewide				
Grades 3-5	Grades 6-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12
I like it a lot	Very interested	4,923	38%	51%	16%	17%	58,442	29%	51%	17%	16%
It's okay	Somewhat interested	4,935	38%	36%	42%	37%	78,565	39%	37%	42%	38%
I don't like it very much	Not very interested	3,098	24%	13%	42%	46%	64,361	32%	12%	41%	46%
<b>Total</b>		<b>12,956</b>					<b>201,368</b>				

**ITEM 6: COMPUTERS & TECHNOLOGY**

**E6. How much do you like using computers and technology?**

**MS/HS6. How interested are you in computers and technology?**

Response Options		Scale-Up Students					All Students Statewide				
Grades 3-5	Grades 6-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12
I like it a lot	Very interested	7,896	61%	74%	42%	30%	94,935	47%	73%	40%	25%
It's okay	Somewhat interested	3,643	28%	21%	39%	42%	69,095	34%	22%	39%	44%
I don't like it very much	Not very interested	1,410	11%	5%	20%	28%	37,215	18%	5%	22%	31%
<b>Total</b>		<b>12,949</b>					<b>201,245</b>				

**ITEM 7: SOCIAL STUDIES**

**E7. How much do you like social studies?**

**MS/HS7. How interested are you in social studies (such as history, American studies, or government)?**

Response Options		Scale-Up Students					All Students Statewide					
Grades	Grades	Total	Subtotal	Grades	Grades	Grades	Total	Subtotal	Grades	Grades	Grades	
3-5	6-12	n	%	3-5	6-8	9-12	n	%	3-5	6-8	9-12	
I like it a lot	Very interested	3,409	26%	27%	25%	22%	48,979	24%	26%	25%	22%	
It's okay	Somewhat interested	5,848	45%	48%	40%	42%	86,156	43%	48%	40%	39%	
I don't like it very much	Not very interested	3,699	29%	25%	35%	36%	66,249	33%	25%	35%	40%	
<b>Total</b>		12,956							201,384			

**ITEM 8: STEM CAREERS**

**E8. When you grow up, how much would you like to have a job where you use science, computers, or math?**

**MS/HS8. As an adult, how interested would you be in having a job that uses skills in science, technology, math, or engineering?**

Response Options		Scale-Up Students					All Students Statewide					
Grades	Grades	Total	Subtotal	Grades	Grades	Grades	Total	Subtotal	Grades	Grades	Grades	
3-5	6-12	n	%	3-5	6-8	9-12	n	%	3-5	6-8	9-12	
I like it a lot	Very interested	5,243	40%	41%	40%	40%	77,068	38%	39%	39%	37%	
It's okay	Somewhat interested	5,369	41%	40%	44%	42%	85,190	42%	41%	44%	43%	
I don't like it very much	Not very interested	2,341	18%	19%	16%	18%	38,924	19%	20%	17%	21%	
<b>Total</b>		12,953							201,182			

**ITEM 9: WORKING IN IOWA**

**E9. When you grow up, how much would you like to have a job in Iowa?**

**MS/HS9. How interested are you in living in Iowa after you graduate and go to work?**

Response Options		Scale-Up Students					All Students Statewide				
Grades 3-5	Grades 6-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12	Total n	Subtotal %	Grades 3-5	Grades 6-8	Grades 9-12
I would like it a lot	Very interested	5,836	45%	52%	34%	32%	73,074	36%	52%	30%	25%
It would be okay	Somewhat interested	4,919	38%	35%	42%	46%	83,470	42%	35%	45%	46%
I would not like it very much	Not very interested	2,156	17%	13%	23%	22%	43,775	22%	13%	25%	29%
Total		12,911					200,319				

## Appendix B: Survey instrument & item frequencies

*Note: All n-counts reflect unweighted sample size. Unless otherwise specified, percentages (%) reflect the weighted percent of survey respondents.*

### SECTION A: Understanding / awareness of STEM and exposure to STEM topics

A1. I'm going to read a short list of topics. Please tell me how much you have heard about each one, if anything, in the past few months. [Randomize list.]

a. PreK-12 STEM education in Iowa	n	Weighted %
A lot	197	19%
Some	271	23%
A little	265	23%
Nothing in the past few months	349	35%
Total	1,082	100%
Don't know / Not sure	6	

b. Water quality in Iowa	n	Weighted %
A lot	246	21%
Some	347	30%
A little	244	23%
Nothing in the past few months	250	25%
Total	1,087	100%
Refused	1	

c. Economic development in Iowa	n	Weighted %
A lot	197	16%
Some	425	36%
A little	283	27%
Nothing in the past few months	180	21%
Total	1,085	100%
Don't know / Not sure	3	

A2. How much have you heard about improving math, technology, science, and engineering education, if anything, in the past month?

	n	Weighted %
A lot	164	14%
A little	435	39%
Nothing in the past month	488	47%
Total	1,087	100%
Don't know / Not sure	1	

A3. You may have heard about STEM education or STEM careers lately. What, if anything, comes to mind when you hear the letters S-T-E-M, or the word STEM? [Field code. Select all that apply. Do not read.]

	n	Weighted %
Exact or close definition of 'Science, Technology, Engineering, Math' (Two or more words)	399	32%
Related to education and/or schools, in general, but no specific mention of science, technology, engineering, or math	135	12%
Stem cells or stem cell research	103	10%
Other [SPECIFY]	133	11%
Don't know / Not sure	79	11%
None / Nothing	270	26%
Refused	3	

A4. STEM stands for "science, technology, engineering, and mathematics." Have you read, seen, or heard of this before?

	n	Weighted %
Yes	775	66%
No	309	34%
Total	1,084	100%
Don't know / Not sure	4	

A5. In general, how interested, if at all, are you in the topic of pre K-12 STEM Education? Would you say...

	n	Weighted %
Not at all interested	131	16%
Slightly interested	171	15%
Somewhat interested	390	35%
Very interested	392	34%
Total	1,084	100%
Don't know / Not sure	1	
Refused	3	

A6. [If A6 = No, skip to A7.] What slogans or tablines, if any, have you read, seen, or heard about STEM? [Select all that apply. Do not read]

	n	Weighted %
Greatness STEMs from lowans	0	0%
Governor's STEM Advisory Council	1	<1%
I heard something but I don't remember what it was	103	14%
Other [SPECIFY]	46	8%
Future Ready Iowa	1	<1%
STEM in your World	0	0%
Don't know / Not sure	72	9%
None / Nothing	551	70%
Refused	2	

A7. I am going to read a list of slogans or taglines about STEM education. Please tell me if you've heard the slogan or tagline... [Randomize list.]

a. Greatness STEMs from lowans	n	Weighted %
Yes	200	19%
No	882	81%
Total	1,082	100%

Don't know / Not sure 6

b. Future Ready Iowa	n	Weighted %
Yes	362	33%
No	719	67%
Total	1,081	100%

Don't know / Not sure 7

c. The future of school is STEM!	n	Weighted %
Yes	188	18%
No	887	82%
Total	1,075	100%

Don't know / Not sure 13

A8. I'm going to read a short list of some groups and events promoting STEM education and careers. Please tell me how much you have heard, if anything, about each one in the past year. [Randomize list.]

a. Iowa Governor's STEM Advisory Council	n	Weighted %
A lot	48	4%
A little	318	26%
Nothing in the past year	719	70%
Total	1,085	100%

Don't know / Not sure 3

b. A Local or Regional STEM Festival	n	Weighted %
A lot	57	5%
A little	183	17%
Nothing in the past year	847	79%
Total	1,087	100%

Don't know / Not sure 1

[INTERVIEWER NOTE: This includes regional STEM festivals with location-based names, e.g. Cedar Valley Family STEM Festival, Southeast Iowa STEM Festival, Cedar Rapids iExplore STEM Festival, Washington County STEM Festival.]

c. STEM Day at the Iowa State Fair	n	Weighted %
A lot	49	5%
A little	276	26%
Nothing in the past year	759	70%
Total	1,084	100%

Don't know / Not sure 4

d. Iowa STEM Teacher Externships	n	Weighted %
A lot	19	2%
A little	173	15%
Nothing in the past year	894	83%
Total	1,086	100%
Don't know / Not sure	2	

e. A STEM event or program in your local school district	n	Weighted %
A lot	168	15%
A little	347	29%
Nothing in the past year	572	56%
Total	1,087	100%
Don't know / Not sure	1	

f. Iowa STEM BEST school-business partnerships	n	Weighted %
A lot	26	2%
A little	236	21%
Nothing in the past year	825	77%
Total	1,087	100%
Don't know / Not sure	1	

g. Statewide STEM Summit	n	Weighted %
A lot	20	2%
A little	198	18%
Nothing in the past year	870	80%
Total	1,088	100%

A9. In Iowa, when you think of STEM jobs or STEM careers, what jobs or careers do you think of? [Open-ended] [Interviewer note: List up to 3.]

SECTION B: Attitudes Toward STEM and the Role of STEM in Iowa

B1. The next questions are about your thoughts regarding the role of STEM in Iowa. Please tell me whether you strongly agree, agree, disagree, or strongly disagree with each of the following statements. [Randomize list.]

a. Many more companies would move or expand to Iowa if the state had a reputation for workers with great science and math skills.

	n	Weighted %
Strongly agree	331	27%
Agree	611	60%
Neither agree nor disagree	10	1%
Disagree	108	9%
Strongly disagree	10	1%
Don't know / Not sure	17	1%
Total	1,087	100%
Refused	1	

b. There are more jobs available for people who have good math and science skills.

	n	Weighted %
Strongly agree	386	32%
Agree	578	55%
Neither agree nor disagree	7	0%
Disagree	94	10%
Strongly disagree	7	1%
Don't know / Not sure	15	2%
Total	1,087	100%
Refused	1	

c. Progress is being made to increase the number of women working in STEM jobs.

	n	Weighted %
Strongly agree	212	19%
Agree	663	62%
Neither agree nor disagree	16	1%
Disagree	86	8%
Strongly disagree	18	2%
Don't know / Not sure	84	8%
Total	1,079	100%
Refused	9	

d. Progress is being made to increase the number of Hispanics working in STEM jobs.

	n	Weighted %
Strongly agree	62	6%
Agree	494	47%
Neither agree nor disagree	44	4%
Disagree	250	23%
Strongly disagree	36	3%
Don't know / Not sure	190	17%
Total	1,076	100%
Refused	12	

e. More people would choose a STEM job if it didn't seem so hard.

	n	Weighted %
Strongly agree	162	16%
Agree	596	56%
Neither agree nor disagree	15	1%
Disagree	242	21%
Strongly disagree	26	2%
Don't know / Not sure	44	4%
Total	1,085	100%
Refused	3	

f. Progress is being made to increase the number of African Americans working in STEM jobs.

	n	Weighted %
Strongly agree	72	7%
Agree	562	53%
Neither agree nor disagree	43	3%
Disagree	179	17%
Strongly disagree	30	3%
Don't know / Not sure	188	16%
Total	1,074	100%
Refused	14	

g. The goal of Iowa's STEM efforts is to fill open jobs.

	n	Weighted %
Strongly agree	131	12%
Agree	681	64%
Neither agree nor disagree	26	3%
Disagree	176	15%
Strongly disagree	14	1%
Don't know / Not sure	57	5%
Total	1,085	100%
Refused	3	

h. The goal of Iowa's STEM efforts is about teaching specific STEM concepts in pre K-12 schools.

	n	Weighted %
Strongly agree	179	16%
Agree	754	70%
Neither agree nor disagree	15	1%
Disagree	62	5%
Strongly disagree	8	1%
Don't know / Not sure	66	6%
Total	1,084	100%
Refused	4	

i. There is a need in Iowa for resources to be put toward STEM education.

	n	Weighted %
Strongly agree	388	33%
Agree	604	57%
Neither agree nor disagree	6	0%
Disagree	55	6%
Strongly disagree	9	1%
Don't know / Not sure	24	3%
Total	1,086	100%
Refused	2	

j. It is important for area businesses to be involved in STEM partnerships with pre K-12 schools in my region.

	n	Weighted %
Strongly agree	410	33%
Agree	588	57%
Neither agree nor disagree	11	1%
Disagree	58	7%
Strongly disagree	8	1%
Don't know / Not sure	13	1%
Total	1,088	100%

SECTION C: STEM Education

C1. How well do you think the schools in your community are teaching each of the following subjects? Would you say that the instruction in [Insert subject] is... [Randomize list.]

a. Mathematics

	n	Weighted %
Excellent	187	18%
Good	526	48%
Fair	257	26%
Poor	83	8%
Total	1,053	100%
Don't know / Not sure	33	
Refused	2	

b. Science

	n	Weighted %
Excellent	161	16%
Good	551	52%
Fair	276	27%
Poor	59	6%
Total	1,047	100%
Don't know / Not sure	39	
Refused	2	

c. Social studies such as history, American studies, or government

	n	Weighted %
Excellent	124	13%
Good	435	40%
Fair	309	31%
Poor	178	17%
Total	1,046	100%
Don't know / Not sure	39	
Refused	3	

d. English, language arts, and reading

	n	Weighted %
Excellent	204	20%
Good	519	48%
Fair	261	26%
Poor	69	7%
Total	1,053	100%
Don't know / Not sure	33	
Refused	2	

e. Designing, creating, and building machines and devices, also called engineering	n	Weighted %
Excellent	99	11%
Good	366	37%
Fair	340	31%
Poor	215	21%
Total	1,020	100%
Don't know / Not sure	58	
Not offered	7	
Refused	3	

f. Computers and technology	n	Weighted %
Excellent	243	25%
Good	527	48%
Fair	230	22%
Poor	56	5%
Total	1,056	100%
Don't know / Not sure	30	
Not offered	1	
Refused	1	

g. Foreign languages	n	Weighted %
Excellent	75	8%
Good	361	38%
Fair	379	34%
Poor	207	20%
Total	1,022	100%
Don't know / Not sure	58	
Not offered	2	
Refused	6	

h. Art	n	Weighted %
Excellent	115	12%
Good	432	42%
Fair	365	34%
Poor	114	12%
Total	1,026	100%
Don't know / Not sure	57	
Not offered	2	
Refused	3	

i. Music	n	Weighted %
Excellent	216	21%
Good	454	43%
Fair	284	26%
Poor	91	10%
Total	1,045	100%
Don't know / Not sure	40	
Refused	3	

C2. I'm going to read some statements about STEM education. Please tell me whether you strongly agree, agree, disagree, or strongly disagree with each of the following statements. [Randomize list.]

a. Overall, the quality of STEM education in Iowa is high.

	n	Weighted %
Strongly agree	50	5%
Agree	643	59%
Neither agree nor disagree	20	2%
Disagree	248	23%
Strongly disagree	26	2%
Don't know / Not sure	99	9%
Total	1,086	100%
Refused	2	

b. A 4-year college program or more is needed for a career in STEM.

	n	Weighted %
Strongly agree	131	12%
Agree	445	44%
Neither agree nor disagree	9	1%
Disagree	409	34%
Strongly disagree	64	5%
Don't know / Not sure	29	4%
Total	1,087	100%
Refused	1	

c. Businesses in my area are involved in STEM partnerships with pre K-12 schools.

	n	Weighted %
Strongly agree	70	6%
Agree	462	42%
Neither agree nor disagree	15	1%
Disagree	339	32%
Strongly disagree	40	4%
Don't know / Not sure	158	14%
Total	1,084	100%
Refused	4	

d. Schools should include information about skilled trades as good career options, such as electrical, mechanical, laboratory or computer tech.

	n	Weighted %
Strongly agree	710	61%
Agree	360	37%
Disagree	14	2%
Strongly disagree	2	0%
Don't know / Not sure	2	0%
Total	1,088	100%

e. I would encourage a child to pursue a career in skilled trades as a good career option, such as electrical, mechanical, laboratory or computer tech.

	n	Weighted %
Strongly agree	643	54%
Agree	415	43%
Neither agree nor disagree	2	0%
Disagree	18	2%
Strongly disagree	4	0%
Don't know / Not sure	4	1%
Total	1,086	100%
Refused	2	

C3. Overall, to what degree do you support or oppose state efforts to devote resources to promote pre K-12 STEM education in Iowa? Would you say you are...?

	n	Weighted %
Very supportive	628	56%
Somewhat supportive	344	32%
Neither supportive nor opposed	69	8%
Somewhat opposed	24	3%
Very opposed	10	1%
Total	1,075	100%
Don't know / Not sure	9	
Refused	4	

C4. Do you think STEM education is a priority in your local school district?

	n	Weighted %
Yes	627	58%
No	308	29%
Don't know / Not sure	152	13%
Total	1,087	100%
Refused	1	

C5. Do you think STEM education should be a priority in your local school district?

	n	Weighted %
Yes	1,020	95%
No	43	5%
Total	1,063	100%
Don't know / Not sure	21	
Refused	4	

SECTION E: Demographics

Now I have just a few background questions and we'll be finished.

E1. How do you identify yourself? Is it...

	n	Weighted %
Male	577	49%
Female	506	51%
In another way - please specify, if you wish	1	0%
Prefer not to answer	4	0%
Total	1,088	100%

Gender [Recoded. Possibly imputed.]	n	Weighted %
Male	579	49%
Female	509	51%
Total	1,088	100%

E2. What is your current age? [Recoded]

	n	Weighted %
18-24 years old	131	13%
25-34 years old	141	17%
35-44 years old	151	16%
45-54 years old	165	15%
55-64 years old	202	18%
65 years or older	292	21%
Total	1,082	100%
Refused	6	

Age groups [Recoded for multivariate analysis. Possibly imputed.]	n	Weighted %
18-34 years old	274	30%
34-54 years old	317	31%
55 years or older	497	39%
Total	1,088	100%

E2a. Are you the parent or guardian of any children aged 19 or under?

E2b. How many of these children currently live in your household?

Parent status [Recoded]	n	Weighted %
No, parent or guardian of 19 or younger	739	65%
Yes, parent or guardian of 19 or younger	347	35%
Total	1,086	100%
Refused	2	

E3. What is the highest level of education you have completed?

*[Interviewer Note: Vocational Training - Occupation specific education. Examples: apprenticeships, mechanic, heating, ventilation & air conditioning, cosmetology, culinary arts, software development, electronic, plumber, carpenter.*

*Trade Certification - Professional designation to assure qualification to perform a specific job. Examples: commercial driver's license, welding, fitness training, nursing assistant, information technology, emergency medical technician.]*

	n	Weighted %
Less than high school graduate	28	7%
Grade 12 or GED (high school graduate)	170	32%
Some education beyond high school, No degree/award	213	14%
Trade certification	69	4%
Vocational training	38	3%
Associates degree	144	11%
College graduate with a 4 year degree such as a BA or BS	271	21%
Graduate degree completed (MA, MS, MFA, MBA, MD, PhD, EdD, etc.)	153	8%
Total	1,086	100%
Refused	2	

Final classification of education [Recoded. Possibly imputed.]	n	Weighted %
High School or less	198	39%
Some College	465	32%
BA or More	425	29%
Total	1,088	100%

E4. Which of the following best describes where you live?

	n	Weighted %
On a farm	128	9%
In a rural setting, not on a farm	127	8%
In a rural subdivision outside of city limits	57	3%
In a small town of less than 5,000 people	226	24%
In a large town of 5,000 to less than 25,000 people	165	19%
In a city of 25,000 to less than 50,000 people	104	12%
In a city of 50,000 to less than 150,000 people	168	19%
In a city of 150,000 or more people	90	7%
Total	1,065	100%

Don't know / Not sure

Refused

Place of residence [Recoded. Possibly imputed.]	n	Weighted %
Lives on a Farm/Rural(LT 5K)	549	45%
Town (5K to 50K)	274	30%
Large City (GT 50K)	259	25%
Total	1,082	100%

E5. Are you currently...? [employment status]

	n	Weighted %
Employed for wages	589	55%
Self-employed	135	12%
Out of work for more than 1 year	7	1%
Out of work for less than 1 year	15	2%
A Homemaker	32	4%
A Student	32	3%
Retired	239	18%
Unable to work	37	4%
Total	1,086	100%
Refused	2	

E6. What is your annual gross household income from all sources before taxes?

	n	Weighted %
Less than \$15,000,	69	10%
\$15,000 to less than \$25,000	67	9%
\$25,000 to less than \$35,000	82	10%
\$35,000 to less than \$50,000	141	16%
\$50,000 to less than \$75,000	183	18%
\$75,000 to less than \$100,000	167	15%
\$100,000 to less than \$150,000	142	12%
\$150,000 or more?	125	10%
Total	976	100%
Don't know / Not sure	38	
Refused	74	

E7. [If E6=Don't know / not sure or refused] Can you tell me if your annual gross household income is less than, equal to, or greater than \$50,000?

	n	Weighted %
Less than \$50,000	24	50%
Equal to \$50,000	2	2%
More than \$50,000	35	48%
Total	61	100%
Don't know / Not sure	12	
Refused	38	

Income [Recoded. Possibly imputed]

	n	Weighted %
Less than \$50,000	395	45%
Equal to \$50,000	398	34%
More than \$50,000	295	21%
Total	1,088	100%

E8. Are you of Hispanic, Latino, or Spanish origin?

	n	Weighted %
Yes	35	7%
No	1,047	93%
Total	1,082	100%
Don't know / Not sure	2	
Refused	4	

E9. Which one or more of the following would you say is your race? [Select all that apply.]

	n	Weighted %
White	1,013	92%
Black or African American	24	4%
Asian	21	2%
Native Hawaiian or Other Pacific Islander	2	0%
American Indian or Alaska Native	20	2%
Other [SPECIFY]	20	3%
Don't know / Not sure	1	0%
Refused	10	

[If more than one response to E9; continue. Otherwise, go to E11.]

E10. Which one of these groups would you say best represents your race?

	n	Weighted %
White	19	85%
Black or African American	2	10%
American Indian or Alaska Native	1	1%
Other [SPECIFY]	1	3%
Total	23	100%

Race [Recoded. Possibly imputed.]	n	Weighted %
White	1,022	92%
Black	24	4%
Other	42	4%
Total	1,088	100%

Race [Recoded for multivariate analysis. Possibly imputed]	n	Weighted %
White	1,022	92%
All other races	66	8%
Total	1,088	100%

E11. What county do you live in? [Available upon request.]

E12. What is your ZIP Code? [Available upon request.]

STEM region [Recoded]	n	Weighted %
Northwest	108	10%
North Central	144	12%
Northeast	186	18%
Southwest	73	7%
South Central	290	27%
Southeast	283	26%
Total	1,084	100%

E13. [If talking to respondent on cell phone, skip to E14.] Do you have a cell phone or can you also be reached via cell phone?

E14. [If talking to respondent on landline, skip to Remarks.] Does the house you live in also have a residential landline telephone?

Phone status of respondents [Recoded]	n	Weighted %
Landline Only	15	4%
Cell Only	673	59%
Dual User	400	37%
Total	1,088	100%

REMARKS: Is there anything else that you would like to say about STEM in Iowa? [Open ended. Available upon request.]

CLOSING STATEMENT: That is the last question about STEM. Everyone's answers will be combined to give us information about the views of people in Iowa on STEM Education.

